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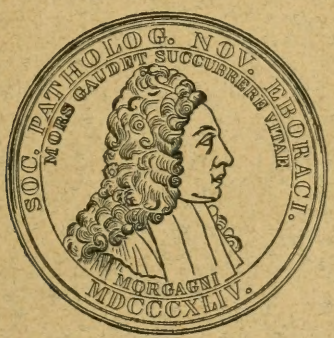

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Dr. Charles Norris, *President.*

DECIDUAL REACTION IN ECTOPIC PREGNANCY.

F. C. WOOD, M.D.

I wish to demonstrate to the members of the Society two early cases of ectopic pregnancy which are of interest chiefly because of the fact that neither specimen was over two months, and that they show an unusually interesting series of lesions in the walls of the tubes and the vessels.

The first case is that of a young woman, about twenty-five years old. The tubal pregnancy was her second; she had previously been delivered of a healthy child. According to her history the pregnancy could not have existed for more than a month and a half. She had the usual symptoms of pain and collapse, and was operated on at St. Luke's Hospital. The tube, as you see, is an irregular mass, about 7 cm. in length and 3 cm. in diameter. It is covered with a shaggy layer of blood clot and fibrin. The tube has ruptured, and from this rupture has escaped the small amount of blood which was found in the pelvis at the time of operation. Sections of the wall of the tube show that it is edematous and in many places necrotic. This necrosis extends for a considerable distance on either side of the rupture. No fetus could be demonstrated. Besides the necrosis, the wall of the tube is very edematous and is infiltrated with small round cells, chiefly of the plasma type. The outer surface shows no peritoneal endothelium under the layers of blood clot. The vessels are distended with blood, and at one portion of the tube there is a large vein, the wall of which is lined with swollen cells with large darkly staining nuclei. The lumen of the vessel still contains a considerable quantity of blood and a few cells of the type just described. The endothelium is intact on the side of the vessel furthest from the lumen of the tube, the cellular invasion taking place

at the side nearest the tube. There is also a large venous sinus near the vessel mentioned, which contains a chorionic villus. The contents of the tube is chiefly blood clot, though there is at the site of implantation of the fetus a large collection of cells of the trophoblastic type, mixed with masses of syncytium and a few fairly well preserved chorionic villi.

The second case was that of a woman of about thirty-five years of age, who had never had any children. About a month before her admission to the hospital she became pregnant. The day before admission she had some pain in the abdomen, and when examined in the hospital was found to have a mass in the right tube which was supposed to be a salpingitis. The mass was removed by laparotomy and was found to be an extremely early ectopic, with a small tear in the tube just above the broad ligament; but not more than a few c. c. of blood had escaped. The tube is slightly smaller than the previous one, and the walls are thinner. They are edematous and infiltrated. The mucous membrane of the tube is well preserved, except at the site of implantation of the egg. Just below the site of implantation is a venous sinus containing chorionic villi with decidual-like cells; and a short distance beyond this is a large artery, the lumen of which is almost completely filled by decidua, as is well shown in the photograph. A few blood corpuscles still remain in the cells. There are a large number of these decidual-like cells in the connective tissue about the vessel. There are no other abnormalities.

These two cases illustrate a condition about which there has been much discussion in the past few years, and may perhaps explain the early rupture in these cases of ectopic pregnancy. Tubes of this size do not rupture on account of pressure due to the fetus or to the collection of blood, because much larger tubes are seen in pyo- or hematosalpinx. There must be some reason for the necrosis of the wall,

and possibly this infiltration and erosion of the tissues by these decidual-like cells and the filling of the vessels by thrombi composed of these cells may cause a necrosis and sloughing of the wall, which permits of the early escape of the embryo. Whether these cells are true decidual cells, such as are found in the endometrium during pregnancy, is not yet definitely settled; but the general opinion at present seems to be that they are not true decidua, but ectoblastic cells from the embryo which grow down into the tissues after the ovum has penetrated the epithelium at some portion of the periphery of the tube. True decidual cells are sometimes seen in the tube during an intra-uterine pregnancy, or in the opposite tube in the case of tubal pregnancy, or in portions of a tube at some distance from the ovum in a tubal pregnancy; but such formation of true decidua is limited and never assumes as extensive a growth as these trophoblastic cells.

In the two tubes shown there was no evidence of the formation of true decidua in the mucous membrane.

A CASE OF TRAUMATIC RUPTURE OF THE CARDIAC ORIFICE OF THE ESOPHAGUS, PROBABLY CAUSED BY VIOLENT VOMITING.

OTTO H. SCHULTZE, M.D.

The specimen in this case had been opened along the median line posteriorly, and presented a rupture of the cardiac orifice of the esophagus, which measured two inches in length in the fresh state. The margins were perfectly clean, gaping about one-half inch, and at each end meeting in an acute angle, thus resembling a fresh wound. The left

pleural cavity was filled with about two quarts of blood discolored by gastric contents. There was considerable cellular emphysema of the mediastinum and neck.

The history of the case was very meager. It was simply that the patient had had intense pain in the epigastrium, had vomited considerable blood and had had all the symptoms of acute anemia. He was infused and an exploratory laparotomy was done, but nothing was found. The case was evidently one of chronic alcoholism, with fatty infiltration of the liver and chronic nephritis. The etiological factor in the lesion was probably violent vomiting.

So far as the cases in the literature were concerned it seemed pretty well established that a normal esophagus may be lacerated in this way. It is not absolutely necessary that the esophagus should be diseased, though, of course, if it is, such rupture might more easily occur. The most common site of rupture is at the lower end. Of the two cases which were presented last year, one was at the cardiac end of the esophagus; in the other case there were two lacerations at the level of the cricoid cartilage. The patient in this case was forty-two years of age. All three cases presented practically the same features, death due to hemorrhage, in this case through complete laceration of the wall of the esophagus communicating with the left pleural sac.

A CASE OF CHRONIC SUPPURATIVE LYMPHADENITIS AND PYLEPHLEBITIS.

E. LIBMAN, M.D., AND H. L. CELLER, M.D.

The case which we wish to present is of more interest from the pathological than from the clinical side, because the patient arrived at the hospital only a few days before death and because she was a Pole from whom a definite his-

tory could not be obtained. The facts, as far as we could obtain them from the relatives and from the various hospitals in which she had been taken care of, were as follows:

She was operated upon on December 1, 1904, at the J. Hood Wright Hospital, for appendicitis. She had been troubled with cramps in the right side of the abdomen for three months before that. These cramps came on at irregular intervals, and lasted for a few days. The appendix was four cm. long; it was gangrenous in the proximal third, and there was a perforation. The appendix was removed and the stump was touched with carbolic acid followed by alcohol. A cavity of pus was found in the left side of pelvis and in the left hypochondrium. The wound was partly sutured and partly drained. The patient left the hospital in good condition; the discharge diagnosis was acute gangrenous appendicitis with advancing peritonitis.

After the operation the patient was well for five months. Then she noticed a small lump in the lower part of the abdomen on the right side; for two months there had been a red area on the left side of the abdomen. In June, 1905, she was operated upon at the Sydenham Hospital for a supposed abdominal tumor. The supposed tumor could be removed only in part. She was in the hospital for three weeks. One week later, in July, 1905, she was again operated upon at Gouverneur Hospital because the wound had not healed. Some further tumor masses were removed, a piece of which was examined by Dr. Norris, who reported it to consist of chronic inflammatory tissue. She was discharged from that hospital in October, with a diagnosis of sarcoma.

For four months after that her wound was dressed at St. Luke's Hospital. She was then a patient at St. Luke's Hospital until last August. Since her discharge from that hospital she had had pain in the left side of the abdomen and there had been a red area present. She had grown very

much thinner; had never vomited blood, but had passed blood by the bowels; there had been no jaundice. She complained of loss of flesh and strength, and of the mass in the abdomen.

On admission to our hospital the examination showed the following:

General condition: Very much emaciated; marked pallor; subicteric hue to skin; liver extended three fingers below the free border, not tender; large scar in median line involving umbilicus, scar two inches in greatest diameter. There was an irreducible hernia at the position of the scar of the appendicitis operation. On the right side of the abdomen there were several sinuses which hardly admitted a probe, the openings of which were not surrounded by any granulations. The rectal and vaginal examinations revealed a bulging.

While she was in the hospital she ran an irregular temperature, which usually reached 103° or 104° F. The leucocyte count was 10,000, of which the polynuclears constituted 94 per cent. The stool was examined for blood, but none was found. The urine was of a specific gravity of 1.012 to 1.020. There was a faint trace of albumin, and microscopically there were seen a few epithelial and hyalogranular casts.

On December 23 there was a hemorrhage from one of the large abdominal veins in the region of the umbilicus. The patient became progressively weaker and died on December 27.

As regards the clinical diagnosis, it was at first thought that there might be an intra-abdominal streptothrix infection, but examination of the pus expressed from the sinuses showed only streptococcus. It was then believed that there was an inflammatory process in the abdomen of unknown causation.

The post-mortem examination showed the following: In the lower part of the abdomen there was a large sacculation of clear fluid. The intestinal coils were markedly adherent to each other. In the mesentery there were numerous pus tracts. The lymph nodes were of the same character as those to be later described. At a number of places in the abdomen there were masses of fibrous tissue due apparently to the healing of purulent foci. There was a particularly large mass at the root of the mesentery. At the site of the appendix operation there was a mass of inflammatory tissue. The sinuses were found to lead directly into suppurating veins in the mesentery. The portal vein was found to contain pus and old thrombotic material; the wall was necrotic; and the branches in the liver were involved. The splenic vein was not involved, but was dilated. The inferior mesenteric vein was found to contain old and recent thrombotic material. The liver was enlarged, congested and cloudy. Many branches of the portal vein in the liver contained pus, and about them there were numerous small and large abscesses, some old and partly healed, some consisting of yellow firm infiltrations.

All of the abdominal lymph nodes, even those along the iliac vessels, were found to be diseased. Most markedly changed were those near the hilus of the liver, the nodes in the mesentery and the nodes along the aorta. The nodes were large, some contained pus, some contained yellow cheesy areas and in a number of these areas there was a deposit of lime. In some of the nodes the cheesy areas were surrounded by fibrous tissue. The spleen was moderately enlarged and pale. The kidneys showed parenchymatous degeneration. The lungs contained a few recent and old abscesses. Some of the abscesses gave evidence of advanced cicatrization. The bronchial nodes showed the same changes

as the abdominal lymph nodes. The heart showed no changes of importance.

The microscopical examination of the various tissues revealed, in brief, the following:

The bronchial lymph-nodes showed areas of complete necrosis, with a deposit of cholesterin crystals. The liver showed purulent pylephlebitis and abscesses in various degrees of organization. Mesenteric lymph nodes showed purulent inflammation with secondary fibrosis and also areas of necrosis.

In the course of the bacteriologic examinations streptococci were obtained from the following: Abscesses of the lung, liver, portal vein, and some of the bronchial and mesenteric nodes. As it might have been suggested that the lesions in the nodes looked like tuberculosis, the material from a number of the nodes was examined for tubercle bacilli, but none was found. A number of guinea-pigs were inoculated subcutaneously and intraperitoneally with emulsions made from the bronchial and mesenteric nodes. None of these guinea-pigs developed tuberculosis.

We have here, then, a case of intra-abdominal inflammatory disease following appendicitis, which lasted, according to the history, for two years. The first impression we had of the case was that there was in the beginning a pylephlebitis due to infection from the appendicitis, and that then the lymph nodes in the abdomen and chest were involved. But careful consideration of the clinical history and of the lesions led us to believe that there is a probability that the infection may have been carried first to the lymphatics and lymph nodes, and then secondarily to the veins. The lesions of the lymph nodes looked much older than the other lesions.

The case appears to have had a longer duration than any case on record. Very few cases have been described in

which a suppurative pylephlebitis has lasted longer than two or three months. In a series of twenty-eight cases tabulated by Dr. Langdon Brown, it was found that in four the duration was under two weeks; in one, two weeks; in five, four weeks; in three, five weeks; in eight, seven weeks; in two, eight weeks; in two, ten weeks; in two, twelve weeks; in one, four months; and in one, eight months.

The lesions in our case point to a possibility of healing in cases of suppurative pylephlebitis. Some years ago one of us (Libman) presented to the Society a case in which the lesions in the liver and portal vein had practically healed. The patient died from an abscess in the mesentery with peritonitis due to rupture.

Rolleston, in his book on diseases of the liver, discusses the question of whether suppurative pylephlebitis can end in recovery. He doubts any reported recoveries in cases in which the liver was not seen. He refers to a case described by West,[1] of multiple abscesses of the liver secondary to appendicitis, in which there was supposed to have been a recovery; but in this case there was no definite proof of the existence of a pylephlebitis.

A case of interest was described by Goodhart.[2] At the autopsy of a boy of eighteen, which was performed after an illness lasting ten months, there was found an occlusion of the portal vein, with scars with caseous centers in the liver. He thought that suppurative lesions due to appendicitis had resulted in cicatrization. The cause of death was a perforation of an ulceration of the descending colon, which ulceration he believed was possibly due to portal obstruction and amyloid disease.

A supposed case of recovery was reported by Treves, but a perusal of the clinical history leads us to doubt the

(1) Trans. of the Clinical Society, XVII, p. 126.
(2) Trans. of the London Path. Society, XXXII, p. 137.

validity of the case, an opinion shared by Dr. Rolleston in a personal communication.

Langdon Brown[3] in his paper states that suppuration in the mesentery and in the lymph nodes is probably not infrequently the cause of infection of the portal vein. He believes this to be the usual course of the disease, an opinion with which we can not coincide, for we have seen in the operating room cases of appendicitis of one or two days' duration in which the branches of the mesenteric veins were already involved. Brown bases his opinion on two cases. In the first there had been an inflammation of the appendix, with occlusion of the mouth of the appendix and suppuration of the mesenteric lymph nodes and pylephlebitis. He believed that the appendicitis first healed and that the lymph nodes were infected and then infected the veins. In a second case of his there was no focus in the abdomen except calcareous and caseous nodes at the hilus of the liver. He cites a case similar to the last, which was described by Sturges, and four cases described by Fredrichs. We believe that the most significant observation, as regards the primary infection of the lymph channels in some cases of pylephlebitis, is a case described by Cruvelhier, in which there were liver abscesses with infection in the sheath of the portal vein without lesions in the interior of the vein.

Discussion.

Dr. Charles Norris asked Dr. Libman whether the lymph nodes were examined for spirochetes.

Dr. Libman said that spirochetes had not been particularly looked for. There was such a straightforward history of inflammatory disease that it was not believed that specific disease came into the question, and the microscopic examination showed that no evidence of specific disease was present.

(3) St. Barthclomew's Hospital Reports, 1901, p. 110.

Dr. J. H. Larkin thought that Dr. Libman's explanation of the case was very unsatisfactory. He thought that perhaps because of the long duration of the case Dr. Libman had allowed the lymphatic theory to overshadow the theory of ascending infection. Unless Dr. Libman was able to give a clear idea of why he thought this infection was through the lymphatics, Dr. Larkin thought it best to hold to the theory of ascending infection through the venous circulation. He did not see how the lesion in the liver could be explained on the basis of lymphatic involvement in a case which had had such a long duration.

Dr. Libman said that he had for a time also been of the opinion that the case was one of primary portal infection, but on considering the specimen carefully he had come to the conclusion that it would be an error to entertain this view only. The clinical history at the onset of suppurative pylephlebitis is generally very severe. The patients have repeated chills and fever, and such a patient would not have been sent out of a large New York hospital as cured. There is no record that she left the hospital with fever. But it is possible that a person could have a slowly developing lymphadenitis without marked symptoms. As a matter of fact the first symptom which the patient noticed herself, after a time had elapsed, was a lump in the right side of the abdomen. A careful examination showed that the thrombi in the inferior mesenteric vein were more recent than those in the trunk of the portal vein, and what is most significant is the fact that the lesions of the lymph nodes, especially in the mesentery and about the portal fissure, were much further advanced than the lesions in the portal vein or liver. Dr. Libman thought that one must consider in this case a primary lymphatic involvement as well as a primary involvement of the vein.

Dr. Norris asked about the condition of the pancreas in this case.

Dr. Libman answered that it was normal.

A CASE OF TYPHOID FEVER IN AN INFANT. A CASE OF GENERALIZED INFECTION IN AN INFANT WITH A BACILLUS OF THE PARA-TYPHOID GROUP. A CASE OF UNIVERSAL FETAL HYDROPS.

A. M. PAPPENHEIMER, M.D.

The first case was that of a child, six months of age, who was admitted to the service of Dr. Lockwood on April 5, 1906. In the hospital history the only noteworthy points were the absence of any previous illness, and a recent exposure to measles. Later it was ascertained that the mother was also ill of typhoid fever at the same time. The child had been breast fed at first, but for the last few months had been fed on condensed milk and barley water. Six days before admission it suddenly became feverish, and refused food, and in this condition, which persisted, was brought to the hospital. There had been no conjunctivitis, cough, epistaxis, or rigidity of the neck noticed. On admission the temperature was 104°, pulse 160. The child was well nourished and developed; but was restless, apparently delirious, and looked very ill.

Physical examination showed an extensive maculo-papular rash on the trunk and upper extremities, a coated tongue, and a palpable spleen. There were no meningeal symptoms, and no abdominal distention. Until its death, which occurred on April 15, or ten days after admission, the temperature persisted high, ranging between 102° and 105°. During this time, the spleen was regularly palpable. There was, at times, slight abdominal distention. The stools, which at first were yellowish, toward the end became greenish with mucus and slight traces of blood. A general bronchitis developed. The possibility of measles being excluded

from the character of the rash, the subsequent course of the illness led to a tentative diagnosis of typhoid fever. Two attempts to isolate the typhoid bacilli from the stools were unsuccessful. A positive Widal reaction was returned from the Board of Health on April 7, although the dilution was not stated. With a laboratory culture, a positive reaction could not be obtained higher than 1-10. Dr. Hastings also reported a negative agglutination reaction.

Leucocyte counts on April 8 and 14 were 6,700 and 8,200 respectively, the lymphocytes forming about 60 per cent. of the total.

The necropsy, which was performed twenty-four hours after death, was limited to the abdominal and thoracic viscera. Briefly, the only noteworthy lesions found were the following:

The posterior portion of the lungs was slightly atelectatic, and there were a few small wedge-shaped hemorrhagic infractions.

The liver was fatty, and on the surface there were a few hemorrhagic punctae. The gall-bladder was normal. Sections showed a few typical small areas of focal necrosis.

The spleen at autopsy was not noticeably enlarged. The kidneys showed acute parenchymatous degeneration, and, microscopically, small areas of acute interstitial nephritis. The stomach contained a small amount of mucus, but otherwise appeared normal.

The small intestine was entirely free from ulceration. Peyer's plaques were visible, and a few near the cecal region seemed very slightly swollen, and were pink in color. The solitary follicles were not microscopically distinguishable. The small intestine contained thin, finely divided feces. Microscopically, the plaques and follicles were hyperplastic, with small areas of necrosis in the centers of the follicles.

In the large intestine the mucous membrane appeared

slightly thickened, rough and mammillated but was free from ulceration. The solitary follicles were not visible. There was a moderate enlargement of the mesenteric lymph nodes, the largest in the ileocecal region measuring about 3 cm. in its longest diameter. On section they were dark pink in color, and very succulent, and microscopically showed the usual hyperplasia with necrosis in the germinal centers and marked hyperemia.

Pour plates were made from the spleen, using Hiss plate medium and agar. All the plates showed numerous colonies of a slightly motile Gram negative bacillus. The transplants yielded pure culture of the typhoid bacillus, as identified by its fermentation reactions, and other cultural characters. In a fresh broth culture, the motility was active. The agglutination reactions with an immune rabbit serum of maximum titer of 1-30,000 was positive after three hours at 1-10,000, and after twenty-four hours at 1-20,000.

The case, therefore, was definitely one of typhoid fever. The only noteworthy feature, from a pathological point of view, was the absence of intestinal ulcerations. Whether this is a constant feature of the disease as it occurs in early infancy, I am not prepared to say, since the number of authentic cases in children under a year are too few to permit of generalization.

* * *

A second case, one of generalized infection with a bacillus of the paratyphoid group, is perhaps of greater interest. A Hungarian baby, three months old, was brought to the hospital on September 6. The history threw little light on the source of the infection. The baby had been fed with grocery milk, said to have been boiled and then diluted slightly with cold "standing" water. It had been poorly nourished since birth, vomited frequently, and cried often. Otherwise,

it had been fairly well until a week before admission, when it vomited and cried continually. There have been no cases of "fever" or other illness amongst the grown persons or children who came into contact with the baby. The child was emaciated, feverish, fretful, and appeared exceedingly ill. The veins of the head were dilated. The fontanelles were open and not depressed. The pharynx, ears, and nose were negative.

The lungs were filled with coarse rales, and there was a suspicion of bronchial breathing in the right axilla. The heart was normal. The abdomen was not distended or retracted. The liver and spleen could not be felt. There was no skin eruption, only a few excoriations. There was a suspicion of Kernig's sign, but no rigidity of the neck.

Blood examination showed 25,000 leucocytes, of which 47 per cent. were polynuclears, the rest lymphocytes. There were no plasmodia.

The temperature, which on admission was 103°, fell within twenty-four hours to normal; but from this time ran an exceedingly irregular course between 104° and subnormal. Two days later, there was noted in the history a stiffness of the neck and slight opisthotonos. The fontanelle was bulging.

The diagnosis in this case was made in a rather curious way. A specimen of the spinal fluid was withdrawn two days before death, and sent to the laboratory. The fluid was absolutely colorless and clear, and there was no sediment for microscopic examination. In order to assure ourselves of its sterility, a culture was made on blood serum. The following day there was an abundant, whitish growth, a smear from which showed a short, rather plump, Gram-negative bacillus. Although we considered this to be probably a contamination, we nevertheless planted it on various media, including dextrose, mannit, lactose, and saccharose serum-water, and Hiss

tube medium. The organism proved to be a bacillus of the paratyphoid group, since it produced gas in the Hiss tube medium, coagulated dextrose and mannit, and failed to ferment lactose or saccharose. Active motility was present in broth culture.

In the meantime, the child had died. The necropsy was not performed until forty-eight hours after death, but the body showed fair preservation. The conditions found were, briefly, the following: The gastro-intestinal tract showed no lesions of consequence. The Peyer's plaques were visible, but were not ulcerated, hyperplastic, or congested. The solitary follicles in the large and small gut could not be distinguished. The mesenteric lymph nodes were small, pale, and firm. The spleen was small, firm, dark red, and smooth on section; the follicles could not be seen with the naked eye. The kidneys were pale and moist, showing the usual appearance of an acute parenchymatous degeneration. In the lungs were a few areas of lobular pneumonia.

The only lesions of interest were found in the head. There was no meningitis, and the brain showed nothing abnormal save slight pial edema. The longitudinal sinus, however, from the vertex to beyond the torcular was filled completely with an adherent, friable, reddish grey thrombus, which extended a short distance on either side into the lateral sinuses. There was no thrombosis of the petrosal sinuses, however. Both middle ears contained purulent exudate.

We had, then, as the sole lesions, a suppurative thrombosis of the longitudinal sinus, a double suppurative otitis, and a lobular pneumonia, doubtless terminal. Bacteriologically, the case was one of generalized infection with a bacillus of the paratyphoid group. Pure cultures were obtained without difficulty from the spleen, from the bile, and from the thrombus itself. All the transplants examined showed an actively motile, small, Gram-negative bacillus, which fer-

mented dextrose and mannit with gas production, but which did *not* ferment lactose or saccharose, which produced an initial acidity in litmus milk, followed by a permanent alkalinity with partial clarification, and which rendered neutral-red-agar fluorescent within forty-eight hours. We have not as yet been able to procure any immune sera to determine the agglutinative relationship of our strain to the different types of paratyphoid.

Microscopic sections of the various organs have shown nothing of special interest, and a description of the histological findings may therefore be omitted. The case is presented as an instance of paratyphoid infection in a three months infant.

* * *

Hydrops Fetus Universalis is defined by Ballantyne in his book on Fetal Pathology as a "rare condition characterized by general anasarca, by the presence of fluid effusions in the peritoneal, pleural and pericardial sacs, and usually by edema of the placenta; and resulting in the death of the fetus or infant before, during, or immediately after birth." Isolated cases have been described from the time of Hippocrates, but Ballantyne, in 1900, was able to collect in all only seventy-odd cases from the literature.

The specimen which we have to present was obtained through the kindness of Dr. Max Schott, who sent the fetus to the laboratory for diagnosis, and supplied us with a clinical history.

The mother was twenty-six years old, a primipara. Her parents were living and well, and there was no personal or hereditary history of syphilis. Her last menstruation was in February of this year. Pregnancy appeared to be normal, and she was free from unusual symptoms until the middle of the sixth month, when it was noticed that her abdomen

suddenly became very much larger, and she developed edema of the feet. She also complained of extreme thirst, and consumed large quantities of water. The urine was free from albumin or sugar. On the morning of September 14, that is, about the beginning of the seventh month of gestation, the bag of water suddenly broke. Labor pains did not set in until later in the afternoon. Dr. Schott was called in the evening and found the external os almost dilated, but was puzzled by the peculiar shape and doughy consistency of the presenting part. The second stage progressed slowly but normally until the head appeared at the vulva. "Then," to quote Dr. Schott, "I tried to aid its passage with my right forefinger by way of the rectum, but this slight effort on my part was sufficient to sever the head from the trunk; it tore off and fell out. In a similar manner, the arm separated from the shoulder when I hooked my finger into it in order to exert some traction on the body." Strong pains continued, and the rest of the body was expelled without difficulty. The placenta, when expressed, was found to be unusually large, irregular, friable, and edematous. The puerperium was rapid and uneventful; the only feature of note was the serous character and copiousness of the lochial discharge.

The fetus presented a really remarkable appearance. The preserved specimens fail to convey an adequate idea of it, and a photograph taken before the fetus was dissected unfortunately did not succeed. The general dropsy in this case was extreme. The features were swollen and distorted; the eyes were closed; there were deep grooves at the root of the nose and between the mouth and cheeks; and, indeed, the livid, puffy face curiously resembled, on a small scale, that of a morgue "floater."

The subcutaneous tissues everywhere were distended with serum. The dorsum of the hands and feet and the labia were perhaps the most edematous regions. Wherever the

skin was incised fluid exuded freely. The serous cavities, thoracic, pericardial, and peritoneal, were likewise filled with clear yellowish fluid of low specific gravity. The lungs were entirely unaerated and pressed against the vertebral column.

Aside from this general water-logged condition, no gross lesions or anomalies were discovered. The adrenals and kidneys appeared rather small for the size of the fetus, but save for a moderate pallor, were in no wise abnormal. The liver and spleen were very friable, but not otherwise remarkable. The intestines contained meconium; the mesentery was short. The thyroid, thymus, pancreas, bladder, and the other viscera appeared entirely normal.

The microscopic sections have not been of much assistance in revealing a cause for the condition. The kidneys show no clear evidence of nephritis, although there appears to be more than the normal number of leucocytes and round cells in the interstitial tissue. In the skin, the cutis consists of an edematous embryonic connective tissue, with numerous collagenous fibrils forming a loose meshwork. Capillaries are abundant, and there are plenty of developing sweat ducts. Fat cells are few and poorly developed. The papillae are rudimentary. The elastic fibers are present, but stain very faintly and show no regular disposition. The thyroid contains no colloid, and the cells are heaped up in the alveoli. The thymus is normal.

Although our study is very incomplete as yet, it is hardly likely that a more careful examination of the tissues will disclose a cause for this obscure and interesting condition. It may, therefore, be worth while to summarize very shortly the few clinical and pathological facts that are known. The etiology appears to rest entirely upon speculation. Maternal nephritis with dropsy has been present in a few of the cases, but this is so frequent an accompaniment of pregnancy, and fetal dropsy is so rare an outcome, that no serious

importance can be ascribed to their coincidence. Careful microscopical examinations of the fetal organs have been recorded in but nine cases (Ballantyne). The majority of these showed little indisputable evidence of nephritis, although in two of the cases there was complete cystic degeneration. The placental findings are inconstant, and may well be secondary. Some of the recorded cases have shown cardiac anomalies—stenosis of the pulmonary osteum, defective septa, or premature closure of the foramen ovale—and the attempt has been made to explain the general hydrops upon purely mechanical grounds. As many of the cases, however, have shown normal hearts, and, conversely, as these congenital cardiac defects frequently occur without edema, the causative relationship is not clear.

Microscopic examination in several of the cases has shown a stagnation of the leucocytes in the liver, spleen, and marrow, and the sections from the liver in our case show a similar condition. This has been interpreted by Sanger as a leukemic infiltration, and the disease regarded by him as a sort of fetal spleno-myelogenous leukemia. Even if this were a constant finding, it would scarcely explain the hydrops. The cause for the hydrops, therefore, is still undiscovered. The dropsical infants are born oftenest to women over thirty, and very rarely, as in our case, to primiparae. There appears to be a tendency for the condition to recur in later pregnancies. Polyhydramnios is the rule; a few of the labors are recorded as dry. The fetus, if born alive, dies within a few hours; often, because of the friability of the tissues, it is badly injured during delivery. The danger to the mother appears to be slight, aside from the increased mechanical obstacle to labor. A successful convalescence is the rule.

A CASE OF DIFFUSE BILATERAL HYPERTROPHY OF THE FEMALE BREASTS.

WILBUR WARD, M.D.

The following case of diffuse bilateral hypertrophy of the female breasts represents a rather uncommon clinical and pathological condition and is, therefore, thought to be of sufficient interest to present here.

The patient, who first came under observation on February 1, 1906, was an unmarried mulatto woman, twenty-one years of age. The family history was negative. She herself had never had any illness confining her to bed. Menstruation began at fourteen, and was always regular, the duration being five to six days, with moderate flow, accompanied by a moderate degree of general pelvic discomfort. Two years previous she had given birth to a healthy child after a normal pregnancy and labor. The child was nursed by the mother and the breasts appeared normal in every respect. At the age of five months, the child died from some unknown cause and the mother experienced no difficulty with the breasts, although she took no especial care of them. Shortly after that time, menstruation began again and was perfectly normal until January, 1906 (one month before admission), when she did not menstruate. Last menstruation, December 25, 1905.

Present Illness. In June, 1905, eight months before admission, she first noticed a small firm lump in the outer and upper quadrant of the right breast. This was not well defined and was slightly painful and tender to the touch; and the overlying skin was very slightly reddened. The patient thought it was a bruise and did nothing for it. The lump gradually grew, however, and extended to all parts of the breast, which became markedly swollen. This increase in the size of the breast continued, and was accompanied by

almost constant pain, dull and aching in character, while the whole breast was very tender.

In January, one month, before she came under observation, and seven months after the swelling began in the right breast, a small swelling appeared in the upper and outer quadrant of the left breast, exactly similar to the original swelling on the opposite side. This has grown in the same way, and for the past two weeks the breast has rapidly become larger, and is the seat of the same kind of dull, aching pain, practically continuous. On admission the general condition was fair and there were no symptoms of any disease.

Physical Examination. The patient is a mulatto woman of small frame, about five feet two inches in height, weighing about one hundred pounds. She is poorly nourished, with little subcutaneous fat; visible mucous membranes pale. Heart, lungs, abdomen, and extremities, negative. Vaginal examination showed that the uterus was slightly enlarged, in normal position, and not tender. Adnexa normal.

Surgical Condition. The breasts are seen to be considerably enlarged, the right more than the left. They preserve fairly well their normal shape, extend downwards over the upper part of the abdomen, and stand out rather prominently from the chest wall. Unfortunately no measurements were taken. The nipples are sound and erect; the areolae are normal. The skin shows a slight diffuse redness without any excoriation; it is apparently neither thickened nor thinned. The subcutaneous veins are enlarged. Upon palpation both tumors are found to be of the same consistency throughout, the peripheral portions appearing the same as the central. They are of a uniform firmness, with a very slightly irregular surface, giving one the impression that the whole mass is made up of many smaller fused nodules. This impression is elicited only by very light palpation, the sensation being lost on firmer pressure. The masses are very sensitive to pres-

sure, the tenderness being general and not more marked in one place than another. The overlying skin is freely movable except at the nipples, and the masses are readily moved upon the underlying muscles. No colostrum is present. No enlarged axillary nodes can be found.

Clinical Course. As the patient suffered increased pain of a dragging character when up and about, seemingly due to the weight of the breasts, she was put to bed, and the breasts were covered with ichthyol ointment and supported. At the same time she was given potassium iodide gr. x and the iodide of mercury gr. ¼ t.i.d. Examination of blood and urine was negative (leucocytes 8,400, 83-17). The local condition remained approximately the same, the pain diminishing with varied external applications up to a certain point, and then persisting with acute exacerbations from time to time. The redness of the skin disappeared early, and did not return. The breasts, however, constantly increased in size.

The patient was kept under observation in the hospital for nine weeks. During that time menstruation did not appear, the uterus and with it the lower abdomen continually enlarged, and a diagnosis of probable pregnancy was justifiable.

The condition of the patient, however, was not satisfactory. The pain was continuous and extreme, the enlargement of the breasts progressive. Practically no nourishment was being taken and the patient slept but little because of pain in the tumors. On April 5, therefore, the breasts were amputated. Two operators, one working on each side, removed them simultaneously through double-V shaped incisions, including the nipples and a segment of skin between the arms of the incisions. No difficulty was found in easily stripping them off the pectoralis major, and enucleating the entire masses. The axillae were not opened.

Thirty-six hours after the operation the patient began to

complain of intermittent abdominal pain and in a few hours delivered herself of a fetus apparently in the fourth month of development. There were no sequelae. The wounds healed by primary union and in the course of two weeks the patient was discharged entirely relieved.

The tumors removed show that the pathological process has involved the entire breast tissue, no normal gland substance being left. The masses are of even consistency throughout from the periphery to the center. The tissue is firm, and on section grayish white, and the whole mass is divided by a few connective tissue bands into large lobuli. The tissue within the lobuli is homogeneous, firm, and very slightly granular. There are no cysts or necrotic, suppurating, or hemorrhagic areas. Blood vessels are small and few in number.

The microscopical picture is the same whether the sections are taken from the periphery or the center. The essential lesion is the production of an enormous number of gland tubules, embedded in an interlacing connective tissue framework; both the tubules and the fibrous tissue correspond closely to these elements as found in the normal resting gland. The glands are simple, or in some places have assumed very irregular forms with narrow lumina, in other places are moderately dilated. They are lined by one layer of cells, usually low cylindrical or cuboidal. The connective tissue is relatively scanty in amount and very cellular. It presents nothing abnormal except an infiltration with cells of the plasma type and in some places a marked degree of edema. Vessels are few in number and small. Fat is almost entirely absent except in the large septae.

Cases of this character have been described by many observers and have almost universally been divided into two groups; those occurring at the time of puberty and those occurring during pregnancy. Nearly all the cases reported can

be put into one of these two groups. Kirschheim, in 1901, collected from the literature thirty-nine cases of bilateral hypertrophy of the breasts; in twenty-seven the appearance of the disorder was at the time of puberty and in nine during pregnancy, leaving three cases in neither group.

The cases appearing at the time of puberty usually give a history similar to the history of this case. The breasts gradually take on growth, but instead of stopping when normal adult size has been reached the process continues and goes on indefinitely. The extent of the enlargement varies greatly. Some grow to enormous size, several cases being reported where the masses extended to the thighs. In the average case they do not extend much below the navel, for by the time they have enlarged to such an extent, relief by operative methods is usually sought.

The cases occurring during pregnancy are somewhat different. The increase in size usually begins during the second month and is rapid and progressive for from two to five months. Then there is a stationary period, and after delivery a rapid reduction in size usually occurs. The reduction in size practically never takes place in the cases occurring outside of pregnancy.

There are few symptoms. In most cases the progressive enlargement is the only symptom until the breasts have reached a moderate size; then there is dragging pain or ache, apparently due to the weight and pulling on the chest wall. In a few cases pain of a sharp, stinging, lancinating character is present early.

The enlargement of the breasts is always diffuse; their consistency is even throughout. There is never any circumscribed tumor in the breast, with parts of the latter of normal consistency. The axillary nodes are seldom enlarged unless there is some ulceration or excoriation of the skin overlying the tumor. Foges reports an interesting case where

there were accessory mammæ in each axilla, which shared in the hypertrophy.

There is usually no impairment of the general health until the breasts have enlarged considerably. That the resulting condition of anemia and malnutrition is due solely to the mere physical presence and inconvenience of the masses is shown by the fact that in all such cases removal of the breasts has caused a prompt return to normal health.

In all cases of true hypertrophy the tumor is made up microscopically of the two main constituents of normal breast tissue, glandular structures and connective tissue, in varying proportions. On the one hand, the fibrous tissue is relatively greatly in excess with but a few atrophied or compressed gland tubules. At the other extreme, as in this case, the glandular structures are enormously developed, with but relatively small amounts of fibrous tissue. All intervening gradations have been observed. As a general rule it has been found that in those cases developing during puberty, the fibrous elements preponderate, while in those cases occurring during pregnancy the glandular elements are in excess.

The prognosis for spontaneous diminution in size for those cases occurring at the time of puberty is almost nil. All kinds of local applications combined with internal medications have been tried without result in almost every case. In the majority of cases amputation has been resorted to; relief is immediate and absolute.

In those cases appearing in pregnancy the prognosis is quite different. In most cases there is a rapid return to normal after delivery, although the condition may return during a subsequent pregnancy. Amputation has been done in these cases, but the opinion of most observers is that operation should be deferred until the effects of delivery are noted.

Our case does not fall properly under the head of en-

largement during pregnancy as the history is clear that the onset antedated conception by at least six months. The condition was probably augmented by the pregnancy. At all events, the pain was so severe and incessant, and the patient so desirous that something be done on that account, that operative measures were instituted. Whether these might have been longer deferred is a question for debate.

MID-WINTER EPIDEMIC OF DYSENTERY OF THE HISS-RUSSELL TYPE, INDIRECTLY TRACEABLE TO MILK.

HANS ZINSSER, M.D.

During February, 1907, the writer had occasion to examine the milk used in the children's ward of a New York institution. For some time diarrhea of a dysenteric type had prevailed among the children, which had resisted treatment. At the time of the milk examination five children were ill, three of them very severely, having very frequent stools, small in size, with much mucus and occasionally small flecks of blood. The patients were in a condition of rapidly progressive inanition. These cases had obviously developed in the hospital and were therefore a source of worry to the medical staff.

The milk was examined at the request of the attending physician, to whom the writer owes the privilege of reporting the cases, and was found to contain about 350,000 organisms to the cubic centimeter. While an attempt was made to identify these, nothing could be found which would account for the existing condition. Nevertheless, in view of the inconclusiveness of the qualitative bacteriological examination

of a milk so rich in organisms, the numerical result was deemed adequate reason for holding the milk responsible, and the feeding was completely changed. Three of the cases were at this time too ill to recover. The two which were in fair condition, however, promptly recovered. No new cases developed in the ward.

From the stools of one of the cases which recovered, the writer isolated an organism, the description of which is as follows:

The organism was a Gram-negative bacillus, morphologically much like B. coli. It was non-motile and non-sporebearing and seemed to grow as well aerobically as partially anaerobically. Upon agar and gelatin its growth resembled B. coli communis. It did not fluidify gelatin. No indol was produced. In fermentation tubes of dextrose, lactose and saccharose, no gas was formed. Upon Hiss tube medium it formed no gas and remained confined to the line of the stab. On the sugar-serum-waters it gave the following reactions:

Dextrose	+	Acid and coagulation.
Galactose	+	Acid and coagulation.
Levulose	+	Acid and coagulation.
Mannit	+	Acid and coagulation.
Maltose	—	Slight acidity.
Lactose	—	
Saccharose	—	
Dextrin	—	
Dulcit	—	
Litmus milk	—	

The organism described may thus be placed among the mannit-fermenting dysentery organisms, differing from the Flexner and Rosen types by its inability to ferment maltose, lactose, saccharose, or dextrin. It seems, as far as its fermentation powers are able to show, to be identical with the B. "Y" of Hiss and Russell. This type was found by Shorer

and Knox to be the most frequent among the types isolated by them from dysentery patients.

The cases are reported for two reasons. In the first place, it seems to the writer that in the case in question the connection between the milk and the infection with the organism is unusually clear. In the second place, the cases occurred in mid-winter in a Northern climate, the milk coming from not further than fifty miles and being handled during transit with reasonable precautions.

Discussion.

Dr. W. H. Park asked whether he had understood rightly that the organism had produced no indol at all.

Dr. Zinsser said that it had not produced indol, and that in placing it in this group he had been guided by Hiss' first report which stated that his organism "Y" did not produce indol.

Dr. Park said that this bacillus was distinguished from others of the group with which Dr. Zinsser had classed it by the fact that it did not produce indol. All the others of this group, the Hiss "Y", the Mount Desert, etc., did produce indol. The Shiga bacillus, however, did not. He believed that in these slight epidemics there would often be found strains of bacilli having slight variations from the characteristic types.

A CASE OF PERITONEAL INFECTION BY BACILLUS TYPHOSUS WITHOUT INTESTINAL PERFORATION.

HANS ZINSSER, M.D.

Dr. Hans Zinsser reported a case of typhoid fever occurring at St. Luke's Hospital, in which there was an unusual location of the bacillus. The case was that of a woman over fifty years of age, who entered the hospital on the thirteenth day of her illness, which was very obviously typhoid. She gave a typical history. Temperature was 104°; pulse slow, 84; leucocyte count 7,000; polynuclear leucocytes 64.5 per cent. Widal reactions were rather unsatisfactory, but she nevertheless had all the clinical signs of typhoid, enlarged spleen and rose spots on the abdomen and back. She was treated as a typhoid patient and nothing of interest occurred until the fourth week of her illness, when she suddenly, at about four a.m., developed pain in her abdomen which was persistent. Perforation was suspected and she was carefully watched and leucocyte counts were made frequently. There was no change in the symptoms, and the leucocytes rose to 16,600. It was believed that operation was advisable, and this was done at about 8.45 p.m. When the abdomen was opened the peritoneum was found to contain a small amount of turbid fluid, some of which was taken out under sterile precautions. The intestine was congested. In the small intestine there was a slight construction, and below this the intestine there was a slight constriction, and below this the intesfluid. The only other unusual thing noticed was that the omentum near the constriction was adherent to the gut, and there were fresh inflammatory adhesions. A very careful search for perforation was made and none could be found. The pelvis was normal. In the fluid, which was sent to the laboratory for examination, there was found a pure

culture of B. typhosus. The patient at the time of the report was on the way to convalescence. The explanation of the finding of the bacillus in the exudate without a perforation can rest only upon conjecture. The most reasonable explanation seems to be that at the seat of the constriction there may have been a deep ulceration, the typhoid bacillus working its way through this.

Discussion.

Dr. E. Libman asked whether there had been sufficient fluid to make a microscopical examination in order to determine whether the turbidity was due to red blood cells or to leucocytes; and also whether there had been sufficient bacilli to be seen before the culture was made.

Dr. Zinsser said that no morphological examination had been made.

NOTE ON INVOLUTION FORMS OF SPIROCHÆTE PALLIDA IN GUMMATA.

JAMES EWING, M.D.

In the earliest observations on syphilitic tissues stained by Levaditi's method, it was apparent that while spirochæte pallida is an extracellular parasite, yet it suffers extensively from phagocytosis and undergoes progressive intracellular digestion by several type of cells, not only in primary lesions but also in secondary and in congenital syphilis. So prominent and constant is this process that one may safely conclude that phagocytosis is an important, if not the chief, means of defense of the organism against syphilitic infection. The

morphology of the intracellular digestion of S. pallida has been fully described and illustrated by Ehrmann[1] and by Gierke.[2]

In a series of chancres, cutaneous lesions, and congenital syphilitic tissues, I have been able to identify, without difficulty, the appearances described by these authors; and I believe that their interpretation of the fragmented and deformed structures is correct. Several rather distinct stages of the destruction of the spirochætæ may be recognized in cases which, on account of the presence of intact organisms must be regarded as undoubted syphilis.

I. The englobed spirochæte may present its usual form, except that it is broken up into two or more fragments, each of which appears as a short pallida.

II. The organism may appear as a chain of granules which outline a complete spirochæte.

III. A characteristic appearance is the radial arrangement of several short fragments of spirochætæ at one or both poles of the nucleus.

IV. Frequently one encounters an organism which incloses a circular mass of protoplasm within the whole or a part of the spirally wound body.

V. The later stages of digestion often leave the cell thickly studded or even distended with jet black granules. Although no definite organism can be identified in such cells, nevertheless their appearance is characteristic, and I have not been able to find such cells in a considerable series of tumors and necrotic lesions other than syphilis.

VI. Finally, the cell may contain several foci of compact granules of the above type, and eventually the granules may lose their capacity to take up the silver and appear as yellow-

(1) Cent. f. Bact., XLIV, 1907, p. 223.
(2) Ibid., p. 348.

ish granules, in which condition they are no longer recognizable as derivatives of spirochætæ.

I have not been able to find the compact homogeneous black masses depicted by Gierke in polynuclear leucocytes.

Not only do the common phagocytes, polynuclear and mononuclear leucocytes, englobe the spirals, but fibroblasts and parenchyma cells, as those of the liver, pancreas, adrenal, and testicle, may take them up in large numbers, so that the appearance of many syphilitic tissues after Levaditi's stain tends to arouse suspicion that the supposed parasites are altogether too numerous to be genuine. However, the very large numbers of spirals occuring in many lesions and the abundant transitional forms between intact spirochætæ and their granular detritus leaves little doubt, I think, that the presence of S. pallida may be recognized with certainty from many of the late stages of intracellular digestion.

The importance of these observations lies in the fact that the whole field of the pathological histology of syphilis must be traversed by means of Levaditi's method, if the nature of many conditions is to be certified, as it now should be, by the discovery in each of them of S. pallida, and if this is to be accomplished, then the diagnosis must sometimes rest on the finding of the less characteristic forms which have suffered intracellular digestion.

In tertiary lesions this work will be especially difficult, for while numerous spirochætæ have been found in a few recent gummata, these lesions have usually been found free from readily recognizable parasites. In spreads of tertiary lesions stained by Giemsa's method, several observers have found isolated spirals, but only after prolonged search; while reports of the study of such lesions stained by Levaditi's method are scanty and usually negative. Reuter found a few S. pallida in syphilitic aortitis.

In a routine search through tertiary syphilitic lesions

during the past year, I have failed to find typical S. pallida; and owing to the danger of confusing structures of unknown origin with fragments of spirochætæ, I had come to regard the search for these organisms in gummata and old productive processes as of little value. Recently, however, a gumma of the testicle was encountered, in which, in addition to a very few slightly deformed spirochætæ, still recognizable as such, there were a great many cells containing large numbers of the fragmented forms enumerated above. A comparison of these cells with others found in chancres and in congenital syphilitic lesions leaves no reasonable doubt that this gumma contains a very large number of S. pallida in various stages of intracellular digestion.

The history of the case, for which I am indebted to Dr. John Rogers, is as follows: The patient was a well-developed subject of thirty years of age. He presented a painless tumor of the body of the testicle which had been steadily increasing for six weeks. There was no history of chancre or eruption; and no enlargement of the lymph nodes or other signs of syphilis could be found. The patient insisted on the removal of the organ. The testicle was moderately enlarged and a gumma, 1.5 x 1 cm., was found in the body and involving the tunica. Both layers of the tunica were thickened and infiltrated with blood.

The examination of sections of tissue stained by Levaditi's method resulted in the discovery of a very few spirochætæ showing the usual characters of pallida, except that they were short, not more than six or eight coils being present. Throughout the necrotic material, and more abundantly on the edges of the lesion, there were many cells containing small fragments of spirochætæ of the types described under classes III to IV. An interesting feature was the presence of many large phagocytic cells in and beyond the borders of the gumma, containing many black granules similar to those

resulting in the last stages of intracellular digestion of S. pallida. On the other hand, some of the best-preserved organisms were found well within the necrotic zone. These relations suggest that the destruction of the organisms had not proceeded far when the tissues became necrotic, and was to some extent inhibited by that event, while the better nourished cells beyond the necrotic zone were able to carry the digestion further and limit the spread of infection. It follows from the comparison of this gumma with others in which no spirochætæ or their derivatives could be recognized, that there is a progressive destruction of the organisms in these lesions, reaching in old cases a complete removal of all traces of spirochætæ. Hence there must be intermediate stages of the process in which the diagnosis of syphilis, if based on Levaditi's method, must rest on the discovery of extensively subdivided fragments and granules derived from digested spirochætæ, with entire absence of typical organisms.

The wisdom of attempting the microscopical diagnosis or syphilis in the absence of typical spirochætæ may very well be doubted, since, as pointed out by Saling, the structures which simulate spirochætæ after Levaditi's method are rather numerous.

But Saling's criticism has only served to define more exactly the positive histological characters of genuine spirochætæ; and the wisdom of attempting to recognize fragments of these parasites depends entirely upon the certainty with which they can be separated from tissue detritus. My present impression is that the partially digested parasites are, in many stages, quite characteristic, and amply so for identification. Among elements which may simulate spirochætæ may be mentioned borders of many varieties of cells, pigment granules in cutaneous chromatophores, fatty crystals or partly saponified fats, calcific granules, detritus from red blood cells, bacteria, and fibrils of the reticular tissue of

lymph nodes. None of these elements exactly reproduce intact spirochætæ; and I have been unable to find that any of them exactly simulate some of the appearances produced by the intracellular digestion of spirochætæ. If this conclusion proves reliable, then one who is fully familiar with the intracellular digested forms of S. pallida will be able to identify many syphilitic lesions by Levaditi's stain, which have heretofore been recognized by their association with other syphilitic lesions, or by the less certain general histological structure of luetic inflammation.

Discussion.

Dr. Charles Norris said that he had himself been rather disappointed in the few specimens which they had put through with the Levaditi method. In them they had been unable to obtain any evidences of spirochætæ, so that as a routine method of diagnosis to distinguish between tuberculosis and the various tertiary lesions of syphilis it was of little use.

A CASE OF HYPERNEPHROMA OF THE ADRENAL GLAND: A CASE OF ANGIOSARCOMA OF THE FOOT: A CASE OF PERNICIOUS MALARIA WITH AUTOPSY.

G. R. SATTERLEE, M.D.

Dr. G. R. Satterlee presented a case of hypernephroma of the adrenal gland. The patient was a janitor, fifty-one years of age, who was admitted to the wards of Gouverneur Hospital, on August 12, 1907. He had been a moderate drinker up to twenty-eight years ago, but since that time

had not used alcohol. He had had gonorrhea. He had also had an attack of lumbago six years ago. Otherwise he had been healthy until four years ago, when he had had a sudden severe pain in the right side radiating to the right side of the sacrum and penis and down the thigh. Several times since then, perhaps ten or twelve, the patient had had similar attacks. He passed bright red blood after each attack of colic. For three and a half months back the patient had noticed that his urine was turbid, containing a slimy substance like pus. His general condition was that of a poorly nourished man. In the abdomen below the right costal border there was considerable tenderness and a definite tumor could be palpated to the liver. The spleen was not palpable. Examination of the urine on August 13, showed tenacious, cloudy mucus; specific gravity 1.015; neutral; much albumin; no sugar; many red cells and occasional leucocytes. Two days later, there was pale, cloudy mucus, many red cells and leucocytes; occasional granular casts. Tests for tubercle bacilli were negative. On August 17, urine showed dark brown cloud, red sediment; specific gravity 1.015; amphoteric; heavy trace of albumin; many red cells and leucocytes, fibrin and debris.

The patient was operated upon by Dr. John F. Erdmann, and the tumor and right kidney were removed. The tumor was an oval mass. 16 cm. long, 6 cm. thick, and 12 cm. transversely, and was intimately connected with the kidney, which was posterior to it. The lower part of the kidney was involved in the growth; the upper part was free. The ureter was free and a probe could be passed through the entire length. The cut surface of the tumor showed small yellowish nodules which were at first thought to be cheesy in character. The tumor was firm and had considerable resiliency. The surface was studded with small yellow nodules apparently about to break down. The cut surface of the kidney showed the

markings fairly regular; the capsule was slightly adherent; and the veins were congested. The cortex was 4 cm. in thickness, and pale; and the blood vessels were much congested. Microscopical examination of the tumor showed irregular lobules separated by fibrous tissue in which some infiltration with leucocytes had taken place. Some nodules were filled with typical adrenal cells in columns. The cells were surrounded by capillary blood vessels and had very fatty cytoplasm. There were a few large oval cells among them with two or three large oval nuclei placed near the center. In some, fatty particles and broken down debris filled up the lumen. There was a considerable amount of brownish pigment in the cells. Many of the lobules contained well defined glandular acini. The tumor was diagnosed as a mixture of adenoma and adrenal tissue, the larger part constituting what is known as hypernephroma. The examination of the kidney showed a combination of chronic parenchymatous with chronic interstitial nephritis. There were a few areas of necrosis suggestive of either tuberculosis or syphilis, but not characteristic of either.

The patient in this case made a complete recovery from the operation and so far had shown no signs of recurrence.

Dr. Satterlee also presented a case of angiosarcoma of the foot. The patient was a young woman, aged twenty-two years, who was first admitted to Gouverneur Hospital in April, 1905. Unfortunately the history notes of that time have been lost. She was admitted for the second time on January 7, 1907. The records note that the previous history up to March, 1905, was negative. At that time the patient noticed a tumor on the right ankle. She entered the hospital where the tumor was removed. After leaving the hospital she felt perfectly well and could walk. In October, 1906, she again had pain in her right ankle and on walking. She had lost weight for some time. On her ankle there was a scar

of a former operation and on the upper edge of the scar there were two nodular growths about the size of a chesnut. About half way up the right leg there was a firm growth. There was general enlargement of all the lymph glands, especially of the right inguinal, which were very hard and attached to the surrounding tissues. The tumors on the foot and leg were excised; none was attached to the bone. The pathological diagnosis was sarcoma, variety not stated.

The patient was again admitted to the hospital in October, 1907, when she walked with a limp in her right leg. Examination showed below the right internal malleolus the scar of a former operation; above this was a growth about the size of a hickory nut. On the inner side of the sole of the foot there was a small metastatic nodule. The patient said that since the operation in January, 1907, she had been perfectly well until four months ago when the growth on the ankle reappeared in the place of the former operation. At the third operation (October 2d, 1907) the growths were removed and skin grafts applied, by Dr. H. M. Silver. The growths had not invaded the deeper tissues to any extent.

One month after the operation recurrence of the growth rapidly took place, and amputation would have been advised except for the fact that the woman was six months pregnant.

Microscopical examination of one portion of the tumor supposed to be a lymph gland showed it to be of an irregular reticular structure, with very large and small spaces. Most of the spaces were lined with endothelial cells and filled with blood. Surrounding these spaces were fusiform cells with oval nuclei. In numerous places the blood had infiltrated the sarcomatous tissue to an extensive degree. No evidences of lymphoid tissue could be seen in this specimen. The specimen from the sole of the foot was about 0.5 cm. in thickness and occupied the subcutis. Microscopical examination showed large spindle-shaped sarcomatous cells closely

packed together. The specimen showed capillary spaces similar to the spaces in the first tumor. Around the walls of these vessels were cells closely applied to the endothelium lining the spaces. The ground substance was fibrous in character. In the superficial subcutis some of the lymph spaces contained masses of sarcomatous cells with a moderate amount of dark pigment. The diagnosis was angiosarcoma.

This variety of tumor has been classed by Sutton with endothelioma and perithelioma. Senn gives a description of angiosarcoma and says the consistency varies from that of a more or less jelly-like mass to considerable density. Angiosarcomata present usually a reticulated structure with the cells arranged in strands. The cells are epithelioid in shape. The ground substance is composed of all possible forms of connective tissue. Vessels are numerous and large and always capillary. In many forms the cells are closely grouped around vessels as if they had been developed in their walls. Blood cysts and hemorrhages are frequent. The masses of cells thus formed may be packed closely together or may be arranged in rounded groups. Angiosarcomata, Senn says, are quite rare and are most frequently found about the head. Other authors distinguish angiosarcoma, endotheliosarcoma and peritheliosarcoma. Dr. Satterlee would prefer to class his case as an angiosarcoma rather than a peritheliosarcoma.

Dr. Satterlee also described a case of pernicious malaria with autopsy. The patient was admitted to the Gouverneur Hospital on October 15, 1907, in the service of Dr. Francis Huber. The patient was a hard drinker, had had gonorrhea several years, but denied syphilis. He was twenty-six years of age, a sailor, and had been in New York only nine days after his last trip. He had spent the winter before in the south. About one week before admission he had suffered from loss of appetite, headache, fever, and chilly sensations

with general malaise. He had not noticed any blood in the stools or urine. On admission, his temperature was 105°; pulse 120; respirations 42. The general condition was that of alocoholic delirium. The next day the temperature was 99°; and the patient was slightly better. Examination showed a well developed, well nourished adult male. Sclerae and skin were somewhat jaundiced. The liver was not palpable; the spleen just palpable. The blood count showed 24,000 leucocytes, of which polynuclears were 56 per cent. The urine had a specific gravity of 1.018, and contained no albumin and no blood. On the morning of the second day in the hospital the temperature at five p. m. rose to 103° and at nine p. m. to 105°. The patient sank into coma and died at midnight after a chill lasting twenty minutes.

The autopsy was performed fifteen hours after death. There was slight jaundice, but no pigmentation. The heart muscle was pale and flabby. The aorta showed a slight fatty infiltration of the intima. The thyroid gland was enlarged to about three times its normal size. The spleen weighed one pound; the surface showed old interstitial splenitis. The liver weighed 6¾ pounds; the surface was pale and mottled. The kidneys showed an acute parenchymatous nephritis. The brain was almost normal, and there was only a moderate amount of congestion in the blood vessels.

Smears of blood obtained at sixteen, twenty-four, and forty hours after the chill and at the time of death, were examined.

The first specimen showed an excessive number of ring forms fairly regular in shape, with moderate amount of fine pigment. In some fields over 75 per cent. of the red cells contained these deposits; most of them with one, but a large number with two, three, four, or even five parasites. The cells in this blood were small and many were crenated. Macrophages were fairly abundant but not as abundant as in

later specimens. The second specimen showed fewer ring forms. The specimen taken forty hours after the chill, or eight hours before death, showed few organisms. The red cells were much larger than at first and some ovoids were seen, with but very few ring forms in this specimen. Here there were some beginning segmenting bodies in the red cells in the peripheral circulation, containing apparently ten segments. The specimen of blood taken at the time of death showed an excessive number of ring forms, crescents and ovoids. Smears from the spleen showed every stage of growth of the organisms including ovoids and crescents and segmenting bodies containing from fifteen to twenty merozites. All the former were characteristic of the tertian variety of the estivo-autumnal parasite.

A CASE OF ARTERIOSCLEROSIS OF THE PULMONARY VESSELS.

HARLOW BROOKS, M.D.

Dr. Harlow Brooks described a case of arteriosclerosis of the pulmonary vessels occurring in a woman, thirty-four years of age, of foreign birth, who was suffering from the results of hemiplegia following cerebral hemorrhage. Her personal history was one of no importance except that she had had one miscarriage at the eight month; there was no other history pointing to spyhilis. On general examination she showed a well defined double aortic lesion. She also suffered from chronic diffuse nephritis and the hemiplegia. This hemiplegia was rather remarkable in one respect, that is, the spastic condition ordinarily found was not present. The course of the disease was unimportant. At autopsy,

the heart showed double aortic and double mitral lesions, both very marked. The aorta and the large trunks were notably of smaller caliber than would be expected. The left ventricle was considerably hypertrophied. Both auricles were dilated and a thrombus was present in the right auricle. The right ventricle was considerably hypertrophied; the wall being about twice the ordinary thickness. The semilunar valves were perfectly functional as far as could be decided, though somewhat thickened. Just above the pulmonary ring there was a dilatation of the vessel, not large enough to be called an aneurism. In all the branches of the pulmonary artery were found large plaques of sclerotic change with raised yellowish masses jutting up into the lumen. Comparing this vessel with the aorta, the aorta was seen to be slightly diseased; while the wall of the pulmonary was not only extensively diseased but was as thick or thicker than the aorta. In addition, there was a pulmonary fibrosis which was very marked about the pulmonary vessels and not about the other trunks, as one would expect with the mitral and aortic lesions. Microscopically it was demonstrated that the thickening of the pulmonary artery extended through all the branches of the artery, even to the smaller. The case was interesting because all the cases of pulmonary arteriosclerosis which have been reported are those in which there was a primary endocarditis. In this case there presumably was not this cause.

The case then differed from the ordinary case as it has been reported in that it seems to have been primary in the vessels. Throughout the body there was a moderate degree of arteriosclerosis, notably in the brain, which was probably the cause of the hemorrhage which had taken place about three years before.

In looking over the literature, Dr. Brooks was surprised

to find the number of cases of arteriosclerosis in the pulmonary vessels. In analyzing his own cases he was also surprised to find that the pulmonary vessels stood seventh in point of involvement, while the visceral trunks were first. In all of these cases he had found evidences of a primary endocarditis.

As regarded the etiology of this case, although there was nothing definite, he was inclined to call it syphilis. All the corroborative evidence was a miscarriage at the eighth month, which was, of course, rather late for one due to lues. He though, however, that it was safe to assume that the etiology was syphilis, largely on account of the gross and microscopic character of the lesions. His explanation of this particular case would be simply that it was like other cases of syphilis but that it happened to have been the pulmonary vessels which were diseased to a remarkable degree while the other organs of the body were only slightly diseased.

Discussion.

Dr. I. Levin said that if he had understood Dr. Brooks correctly he had here a case of localized arteriosclerosis, the etiology of which he ascribed to syphilis. This reminded him of cases of endarteritis of the lower extremities, also of a case or arteriosclerosis apparently with a secondary gangrene which some writers ascribe to syphilis as the chief etiological factor. Lately he thought the majority of writers denied this and said that while we do not know the etiology of a number of cases we can not point to syphilis as the main factor. He would like to ask Dr. Brooks what his real proof was, outside of the miscarriage, that this was syphilis. It seemed to him that the question of localized arterioscler-

osis was something which required an explanation; but he did not think that syphilis would explain it.

Dr. T. C. Janeway asked Dr. Brooks if he did not think that the double mitral lesion with the resulting mechanical effects might have had something to do with the changes in the pulmonary system in this case.

Dr. Brooks said that he had tried to persuade himself that Dr. Janeway's explanation was correct, but that he had finally thrown it out because the changes were so very pronounced and so definitely limited to this one arterial system. The reason he had for calling the case syphilis was simply the reason most of us had when we do not know what else to call it. The character of the arteriosclerosis was more like that which ought to occur in syphilis than anything else he knew of. There were no gumma throughout the body, and nothing certainly syphilitic. The only reason was that it seemed the most probable explanation.

THE REACTIVE POWER OF THE WHITE RAT TO TISSUE IMPLANTATION.

(A Preliminary Communication.)

ISAAC LEVIN, M.D.

The question, with what measure of success can we implant tissue or even whole organs of a highly organized animal into another part of the same individual or into another individual of the same species, is of greatest interest and importance in biology and medicine.

While every cell of an organism, no matter how highly differentiated, takes part in the metabolic processes of nutrition, comparatively few cells retain the power of pro-

liferation. The same difference in the life energy of the cell takes place apparently when it is severed and implanted in a new place. The thyroid, pancreas, the whole kidney even, are being transplanted and are able to perform their normal functions for a certain time. On the other hand, we meet with far less success when we are implanting only pieces of an organ with the aim of causing the further proliferation of cells of the severed tissue.

Of all the pathological processes where proliferation of cells takes place, the hardest to comprehend as well as the most important, is the formation of a malignant new growth, and practically all the experiments with the implantation of tissue have been done in order to elucidate the genesis of malignant tumors.

The implantation of normal tissue, embryonic or adult, was usually done in order to prove a certain preconceived theory as to the factor inciting the cell proliferation in a new growth. In the great majority of experiments the results were negative. The implanted tissue usually becomes necrotic and is subsequently absorbed. The only exception is implanted epigermis which proliferates to some extent.

In 1901, I published the report of a series of experiments which I had undertaken on rabbits and dogs with the implantation of different tissues. With the exception of implanted epidermis my results were uniformly negative. The implanted tissue was always absorbed. Nichols reported, in 1905, a very similar set of experiments with the identical results.

A priori one would expect more success with the implantation of pieces of tumor than with normal tissue. Whatever the cause, tumor cells are certainly in a state of increased proliferation. But the implantation of tumor tissue in animals gave the same negative results. The successful

transplantation of the sarcoma of the genital organs of the dog can not be considered here, as the question whether this is a real tumor or an infectious growth similar to lues, is not yet settled.

In complete contrast with all these negative results stands the great success of the transplantation of sarcoma and carcinoma in white mice and rats. Since the first reports of positive grafting by Hanau, in 1889, an immense number of successful transplantations were done by Morau, Velich, Loeb, Jensen, Michaelis, Bashford, Ehrlich, Flexner, and others. This great difference between tissue implanted into any other animal which had so far been experimented upon, and pieces of a tumor of a white rat or mouse implanted into another animal of the same species, could be due only to one of two causes: Either the intrinsic power of limitless proliferation of a carcinoma or a sarcoma cell of a white rat or mouse is greater than that of any other cell, or else these animals react to tissue implantation, in a way different from other laboratory animals. The majority of the workers in this field seem to lean to the first explanation, and think even (Apolant), that the experiments on these animals have proven that the genesis of tumors must be explained by the intrinsic power of a tumor cell to limitless proliferation. Nevertheless there are facts in the results of these transplantations which seem to indicate that a great deal may be due to the reaction of the organism to the implantation.

In the first place, while a cell may act quantitatively differently in a different animal, it is hard to suppose that tumor cells so completely identical morphologically will be absorbed completely when implanted in any other animal, and will continue their growth and proliferation in a rat, and that still the difference will lie only in the cell itself. If in subsequent generations, implanted tumors become more

virulent, that is, proliferate more readily, the different behavior of the cell in the second host must be due to something which the cell acquired under the influence of the first host. The same is true with still greater force in cases of attenuation of the proliferating power of the cell, or the so-called immunity. The same holds true for the fact that the same tumor while growing well in a rat taken from Copenhagen does not grow at all in a rat from Berlin.

It may be interesting to note in this connection the following facts: A great deal of work was done with transplantation of human tumors on an animal and, as was to be expected a priori, with negative results. But Dagonet succeeded by implanting human carcinoma on a white rat in producing a real epithelial growth; and, what is very important from the standpoint of the influence of the host on implantations, the cells in the rat differed in size from the implanted human cells.

The hardest phenomenon to explain by the intrinsic power of the implanted tissue is the change of an implanted carcinoma into a sarcoma. Ehrlich thinks that in these cases the connective tissue stroma of the implanted tumor changes into sarcoma; but it would certainly be impossible to prove that this stroma is the implanted one and not the one formed by the host.

In view of all this it seems a priori possible that the white rat reacts differently to implantation, not only of tumor, but also of normal tissue; and to test this question experimentally this research was undertaken. I am implanting tissues of different organs into another place of the same rat or into other rats. While the work is not yet finished by far, and the detailed report of the experiments will be published later, some impressions have already been gained which seem of considerable interest.

Pieces of tissue of a size that would be absorbed in another animal very rapidly remain unabsorbed in the rat for a longer time, even when, as in the peritoneum, they do not become attached anywhere, but float like a foreign body. Much more frequently the pieces are either surrounded by a capsule consisting of an outer fibrous layer and an inner one, made up chiefly of round cells, or else the round cells invade and eat away as it were the implanted tissue. One is impressed with the great amount of organization going on around the implanted pieces. On the other hand, the pieces themselves seem to retain the cell structure much longer than is usual in other animals. The specimen shown under the first microscope was prepared from a piece of liver which was implanted ten days before the animal was killed, and the nuclei are still apparent. The same specimen shows the great quantity of round cells around the implanted piece.

Under the second microscope is shown a specimen from a very interesting case. A piece of skin which had previously been for a week in the peritoneum of a rat was implanted into the peritoneum of another rat. The animal was killed thirteen days later. At the autopsy there was found a tumor the size and shape of a nut, which was adherent to the anterior wall of the stomach and the lower surface of the liver, and moved freely with the liver. On incision it appeared to be a cyst containing a cheesy mass and pus; the wall was about one-eighth of an inch in thickness. As is seen under the microscope the wall of the cyst consists of an external fibrous part and an internal cellular one. Such a reactive cellular organization, whether against an implantation of foreign tissue or even against infection, one does not meet in other laboratory animals.

We know then that the implanted tumor of a rat proliferates and grows. We also know that extracts or filtrates

of tumors without cells do not produce any growth in another animal.

The aim of my work is to see whether the normal tissue of a rat implanted into another rat will itself grow or only incite the cells of the host to proliferation, and whether it can incite to proliferation only the connective tissue cells, or the epithelium also. Should the cells of a normal implanted tissue not proliferate, then I shall combine normal tissue with cell free extract of a tumor, and shall note whether in this combination a normal cell can be caused to proliferate in the host. All this will be the subject of my future communication.

In conclusion, I wish to express my gratitude to Prof. T. M. Prudden for the privilege of the laboratory. Prof. J. H. Larkin has aided me greatly in the microscopic part of the work, and I take pleasure in extending to him my thanks.

Discussion.

Dr. James Ewing said that Dr. Levin had an important topic for experimental investigation. He would like to say as one of those who had read Dr. Levin's original paper on the subject that this was not entirely overlooked, at least not by a great many who were interested in the subject. The work which Dr. Levin had reported was, of course, as he had said, too incomplete to warrant any criticisms. The piece of tissue which he had shown was interesting, but only if it proved to be a tumor; and Dr. Levin had said that it was not a tumor. The work reminded Dr. Ewing of that reported at the Heidelberg conference by Lewin, who transplanted tumors from one animal to another and was able finally to get the recipient's tissues multiplying to such an extent that they were able

to continue growth in successive animals far more than is normal. Dr. Levin had brought out one new idea which Dr. Ewing had not heard expressed before, in regard to the transmissibility of tumors in certain animals. It has always been supposed that the differences in growth were due to differences in the cells; possibly, as Dr. Levin had suggested these were due to the reaction of the different animals to the transplanted cells. It seemed to him, however, that certain factors told against this theory. In the first place, there are few tumors of rats and mice which are transplantable. The vast majority of tumors in these animals behave as do tumors in other animals; that is, they resist transplantation. In regard to the lympho-sarcoma of dogs, of which Dr. Levin had spoken as not proven to be tumor, Dr. Ewing would like to refer him to the points which Dr. Beebe and he had put forward on this subject, and to invite him to visit the laboratory of the Cornell Medical College, to see the specimens on which their statements were based.

Dr. J. H. Larkin said that he had for some time had an opportunity of looking at some of Dr. Levin's work and noting his very careful technique, and had examined a great deal of tissue which he had implanted. While he did not concur with all of Dr. Levin's conclusions he would say that the suggestion which he had made in regard to the individual cells had something to it. In a number of transplantations which Dr. Levin had made of transplanted tissue the individual powers of that tissue to remain for long periods in other animals was very marked with white rats. In one of Dr. Levin's specimens of a case of transplantation of liver tissue, one could see very well the still persisting liver tissue in the center surrounded by its own leucocytes and again surrounded by a mass of connective tissue. That to Dr. Larkin's mind could mean only foreign body. The individual power of that piece of rat liver to persist in an-

other liver going on for that period of time, a power not found in other animals, was very suggestive.

THE INFLUENCE OF INJECTED LEUCOCYTES UPON THE DEVELOPMENT OF A TUBERCULOUS LESION.

E. L. OPIE, M.D.

Dr. Eugene L. Opie presented some studies on the effect of injected leucocytes on the progress of a tuberculous lesion. For the purpose of the experiments the dog had been selected although this animal is naturally somewhat insusceptible to tuberculosis. Previous study had made Dr. Opie more familiar with the leucocytes of the dog than with those of other animals, and it had been found possible in this animal to obtain leucocytes in immense number.

Tuberculous pleurisy was induced in dogs by the injection of a suspension of tubercle bacilli into the pleural cavity. The lesion induced by the injection of 0.5 c.c of such a suspension is usually fatal in from five to six weeks. Occasionally, the disease runs a longer course of eight or more weeks. There is a rapid accumulation of fluid, which at death may amount to several hundred cubic centimeters, in the two cavities. The change is bilateral; injection into the right pleural cavity is followed by lesions on both sides of the chest. There are masses of tuberculous tissue, usually partly caseous, in the mediastinum and in the membranes below the pericardium. There are flat tuberculous nodules upon the pleural surfaces. There is tuberculosis of the mediastinal lymphatic glands with immense enlargement; and, finally, tuberculosis of the lymphatic glands elsewhere.

The lesion is especially adapted to a study of this kind because it can be followed during life by percussion of the dog's chest.

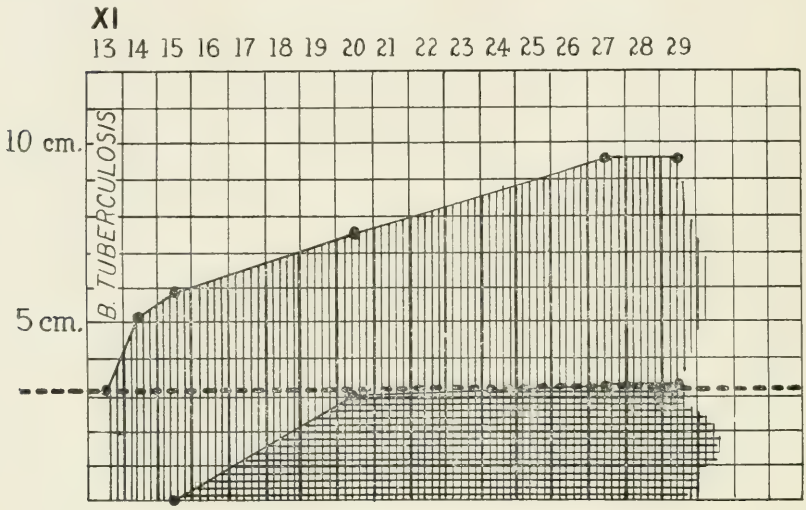

Fig. 1. Chart showing changes of dullness on percussion over the right pleural cavity into which has been injected a suspension of tuberculosis. Relative dullness, represented by light shading and absolute dullness, represented by dark shading, have been measured from the median line with the animal standing in its normal position. The dotted line represents the level of normal relative dullness caused by the projection of the heart to the right of the median line and measured at the time of inoculation.

Series D, XXX.

Dr. Opie showed a diagram (Fig. 1), representing the changes of thoracic dullness which follow such an injection. The normal relative dullness caused by the heart usually extends two to three cm. to the right of the median line. As the result of the injection there is within twenty-four or forty-eight hours an increase of this relative dullness, and later perhaps absolute dullness marks its appearance. Occasionally, the absolute dullness which is caused by fluid within the pleural cavity may later disappear completely.

Relative dullness persists and autopsy shows that it is produced by masses of partially caseous tuberculous tissue. The presence or absence of absolute dullness doubtless depends upon the quantity of the fluid in relation to the size of the animal's chest. Since the lesion can be followed during life, it is especially satisfactory as a means of testing the effect of leucocytes injected into the chest.

Before passing to the effect of leucocytes upon this lesion, Dr. Opie described the effect of leucocytes injected into the normal pleural cavity. Leucocytes are obtained by injecting turpentine into the pleural cavity of a dog; they are washed; and the volumes injected represent almost solid cells. Injection of a small quantity (for example, 10 c. c.) of leucocytes into the pleural cavity of a normal dog causes an immediate increase of the relative and often of the absolute dullness in twenty-four hours; this increase of dullness is due to the presence of fluid. The reaction soon subsides; at the end of forty-eight hours the fluid is diminished in amount; and within two or three days the dullness has returned to normal. This change has been repeatedly produced in the same dog; and one animal which was killed after the fourth injection of from 10 to 12 c.c. of leucocytes showed a perfectly normal pleura.

When the leucocytes were injected into the pleural cavity of a dog in which tuberculous pleurisy had already developed, a fairly constant series of events followed. In all the experiments the injections of leucocytes were made only after it was possible to determine by percussion that a tuberculous pleurisy had developed, that is, about ten days or two weeks after the original injection of tubercle bacilli. At that time dullness over the dependent part of the right pleural cavity was considerably increased. Another diagram (Fig. 2), was shown, representing the condidition of the animal's chest when leucocytes were injected

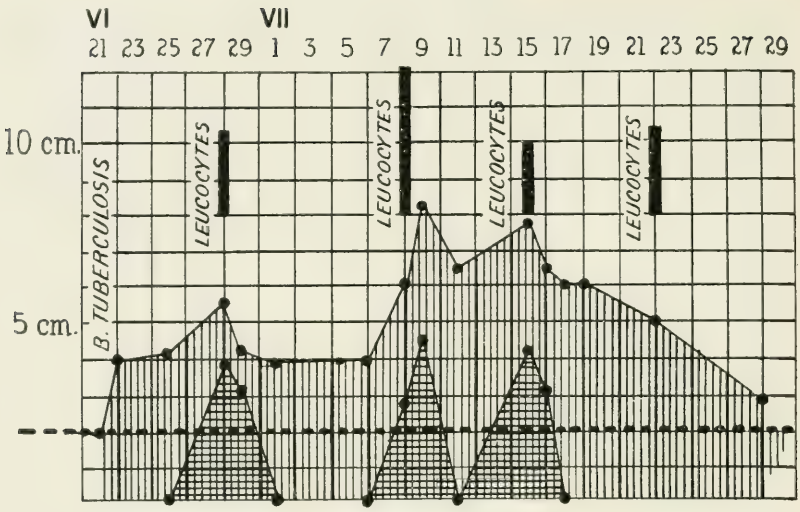

Fig. 2. Chart showing the effect of injected leucocytes upon dullness on percussion over the right pleural cavity which has been inoculated (21-VI-'07) with tuberculosis. The quantity of leucocytes injected is represented by the length of the short heavy lines, each space measuring 5 c. c. of washed cells. Series A, LIV.

into an animal whose thoracic dullness had been increased as the result of tuberculosis. At the end of seven days after inoculation, 10 c.c. of leucocytes were injected, and an immediate fall of relative dullness and disappearance of absolute dullness followed. The relative dullness, which did not return to the normal level was found to have increased after ten days, and a large quantity (22 c.c.) of leucocytes was introduced. Dullness did not diminish, but there was an increase of dullness followed by a fall and then quickly by another rise. It was interesting to note that a large quantity produced less diminution of dullness than a small quantity. Again introducing a small quantity of leucocytes there was a loss of dullness, and after the fourth injection there was still further loss.

The first series of experiments was performed at the

beginning of last summer and the phenomena described had been frequently repeated: the smaller quantities of leucocytes producing diminution of the dullness, occasionally with a slight preceding increase, and the larger quantities producing considerable increase, usually followed by a fall below the level before injection. Repeating the injections too close together, i. e., at intervals of less than a week, seemed to have an injurious effect.

The control animals showed a fairly uninterrupted increase of thoracic dullness. The injected animals showed a fall below the level present at the time the injections were started, and their area of dullness measured to the right of the mid-line approximated closely that present before injecion of tubercle bacilli.

At the end of the summer, injection of leucocytes was stopped and the disease was allowed to take its course. The result of this series was as follows: Two controls died at the end of 34 and 37 days. An animal which received three injections died at the end of 57 days, and a second animal with three injections at the end of 68 days. An animal which received four injections died at the end of 89 days. Another animal which received four injections is still living at the end of six months and appears to be entirely well.

A second series of experiments is now in progress. It consists of seven animals, three of which are controls. Of the controls the character of the charted dullness is that already shown; usually a steady progress and perhaps death with accumulation of fluid. Of the three controls, two died at the end of five and six weeks respectively. The third control is still living with a considerably increased area of dullness. Of the four animals treated all have dullness corresponding to that before injection.

In a third series of experiments the results were contrary to those described. The control showed the course

exhibited by the other control animals, that is, a steady increase of both relative and absolute dullness. The second animal whose condition at the end of ten days was approximately that of the control received an injection of leucocytes which was followed by a disappearance of absolute, and marked fall of relative dullness. A second injection at the end of three days caused an increase of dullness. A third small injection was followed by a fall of dullness; but a very large injection (25 c.c.) was not followed by the usual fall; and this animal died at the end of 56 days. The control was then immediately killed and a comparison of the lesions was made. The animal receiving the tubercle bacilli without injection of cells showed advanced tuberculosis with large caseous masses in the mediastinum and in the membranes of either side of the pericardium. The animal receiving the injections of leucocytes showed chronic pleurisy with fibrous thickening of visceral and parietal pleurae. Compared with the control the tuberculous lesions were insignificant; there were small fibroid masses in each side of the pericardial cavity. Especially comparable were the mediastinal lymph glands; those in the animal which had received cells were small, whereas those in the control animal were several centimeters in diameter and were markedly caseous.

Since the foregoing experiments indicated that injected leucocytes retard the development of the tuberculous lesion, animals were inoculated with tubercle bacilli together with leucocytes, in the hope that the lesion might be entirely prevented. This hope was not realized; but the influence of leucocytes was marked. The immediate effect of the simultaneous injection of cells and tubercle bacilli was practically that of the injection of cells alone. There was an immediate increase of thoracic dullness followed by its complete disappearance at the end of forty-eight hours (Figs. 3 and 4). At first it was thought probable that tuberculosis would not develop, but at the end of about ten weeks dullness reappeared and it was obvious that the onset of tuberculosis had not been prevented. The animals which had received cells were given further injections and the dullness was reduced.

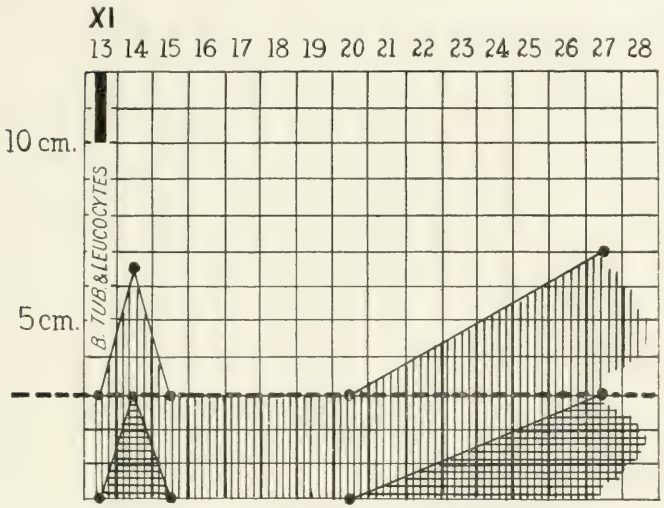

Fig. 3. Chart showing changes of dullness on percussion over right pleural cavity inoculated with a mixture of tuberculosis and leucocytes. Series D, XXVIII. Compare with Fig. 1, which represents the control animal of this series.

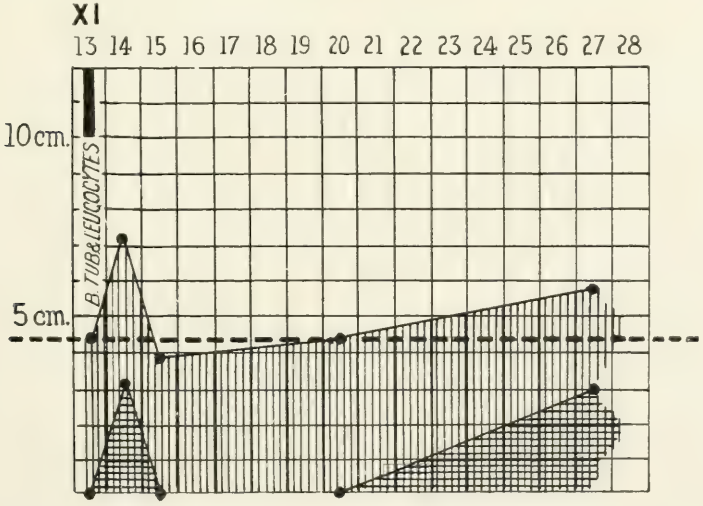

Fig. 4. Chart showing changes of dullness on percussion over right pleural cavity inoculated with mixture of tuberculosis and leucocytes. Series D, XXIX. Compare with Fig. 1, representing the control of this series.

In view of the fact that the lesion appeared to be retarded, a second series of two animals was prepared in the same way, and the result was identical. Inoculation of the control animal with tubercle bacilli alone was followed by a slow and continuous increase of relative dullness and the appearance of absolute dullness. The injection of cells plus tubercle bacilli was followed by a sharp rise of dullness with quick turn to normal; but at the end of two weeks abnormal dullness reappeared. The two animals were killed twenty-four hours after the appearance of the lesion in the the animal receiving the leucocytes, and comparison of the lesions in the two animals was made. The animal which had received tubercle bacilli plus leucocytes showed a comparatively small amount of tuberculous tissue, and that which was present was almost wholly on the left side, the injection of tubercle bacilli and cells having been on the right. The animal receiving tubercle bacilli alone showed very large masses of tuberculous tissue on both sides of the chest. This animal exhibited many nodules upon the parietal pleura, whereas the animal receiving cells had an almost smooth pleural surface. There was anatomical as well as clinical evidence that the presence of leucocytes had retarded the development of the tuberculous lesion.

LEUCOCYTES IN PROTEIN ABSORPTION.

P. A. LEVENE, M.D.

The mechanism of protein absorption still remains insufficiently explained. The greatest difficulty in solving the problem is found in the fact that proteins of the tissues and those of the food differ little in their chemical composition. In recent years a number of proteins have been dis-

covered which differ in their composition from the usual tissue proteins. However, after feeding animals on these substances it was impossible to detect them either in the blood or in the other tissues.

It has also been established in recent years that in the course of digestion proteins undergo a very definite alteration in their composition. Proteins consist of a chain of amino acids linked in such order that some are removed from the molecule by the action of enzymes with less difficulty than the other acids. Thus, leucin and tyrosin are generally the first amino acids split off on protein digestion; glutaminic acid remains the longest combined into a complex molecule. A digested protein, therefore, differs from the native substance in that it contains a lower proportion of leucin and tyrosin, and a higher proportion of glutaminic acid.

In the course of a study of the composition of nucleoproteins of various organs, Dr. Mandel and Dr. Levene had made the observation that the nucleoproteid of the spleen contained a considerably higher proportion of glutaminic acid (25 per cent.) and a lower proportion of leucin, than any other animal protein, thus resembling the proteins which have undergone to some extent the process of digestion. On the ground of this observation it seemed suggested that the leucocytes derive some of their proteins from the intestinal tract, and thus serve as transporters of the food proteins.

Discussion.

Dr. James Ewing asked Dr. Levene whether he thought that the fact that glutaminic acid remained longest in the cell undergoing digestion would explain the high proportion of glutaminic acid in the protein of tumors which are supposed to autolyze more rapidly than other tissues.

Dr. Levene asked whether it was known that the glutaminic acid in tumors was in high proportion.

Dr. Ewing said that certain examination had been reported in which a high proportion of glutaminic acid and a low proportion of leucin had been found in tumors, and it was thought that this was characteristic of tumor tissues. He had thought that, in view of Dr. Levene's results, an active autolysis of the tumor might explain the persistence of glutaminic acid.

Dr. Levene thought it very possible that this might be so.

SPORULATION OF THE GROUP OF BACILLUS AEROGENES CAPSULATUS,

HIDEYO NOGUCHI, M.D.

Bacillus aerogenes capsulatus (Welch) is noted for its persistent refusal to form spores when cultivated in most of the artificial nutrient media. Dunham first succeeded in inducing its sporulation in a coagulated serum medium, in which the spores were seen to form in the condensed water. Without touching the question whether *B. aerogenes capsulatus* of Welch and Nuttall is identical with *B. phlegmonis emphysematosae* of Fraenkel, on the one hand, and *Granulobacillus saccharobutyricus immobilis* of Grassberger and Schattenfroh, on the other, we have in them in common a persistent absence of sporulation in usual culture media, notwithstanding the fact that these strains had been primarily, and can always be, isolated by the means which necessarily indicate the occurrence of sporulation under natural circumstances. Fraenkel, as well as Hitchmann and

Lindenthal failed to induce sporulation of Fraenkel's bacillus; while Grassberger and Schattenfroh also state that it is difficult to obtain uniform sporulation of their immobile butyric acid bacillus in ordinary nutrient media.

In his exhaustive and extensive researches on the anaerobic flora of the intestine, both of human subjects and of animals, Herter observed occasions where sporulation of the gas bacillus was undeniably demonstrated in the intestinal contents, especially in the feces of carnivorous animals. Still, he recognizes the inconstancy of sporulation of this bacillus even in the feces, and agrees that it seldom sporulates in usual culture media,

Grassberger and Schattenfroh give a method by which they were able to induce uniform sporulation of their immobile butyric acid bacillus. Their method consists in adding varying amounts of alkali to 0.1 per cent. starch agar, usually 5 to 20 drops of N/5 NaOH solution to 10 c.c. of the starch agar. Their purpose in preparing many tubes of varying alkalinity was to get the optimum alkaline reaction for the sporulation. This method seems, however, not to have received much attention from those who are working in similar lines, and sporulation of the group of *B. aerogenes capsulatus* remains to-day still an uncontrollable factor.

While working with several strains of the group of *B. aerogenes capsulatus*, I had occasion to observe sporulation of these strains when cultivated in certain media, and thought it advisable to communicate the results briefly. The strains with which I worked included *B. aerogenes capsulatus* (for which I am under deep obligation to Prof. Theobald Smith), *B. Saccharobutyricus immobilis*, isolated by myself from market milk, and two more strains of *B. aerogenes capsulatus* isolated from human feces. When cultivated in usual fluid or solid media, none of them formed spores. The strain obtained from Professor Smith occasion-

ally formed spores in sugar-free media, while the other failed to sporulate under the same conditions. It may be stated that the reaction of the media employed had an alkalinity corresponding to about N/50 to N/75 NaOH, that is, that much alkali was required to make it neutral to litmus paper, although the alkalinity above stated did not react to phenolphthalein.

The results which I obtained with these organisms may be summarized as follows:

Using the sugar-free bouillon with alkalinity corresponding to N/50 to N/75 NaOH as the basic medium, I added various kinds of carbohydrates in the ratio of 1 per cent., and inoculated each series. After cultivating them for from three to seven days, anaerobically at 37° C., they were examined microscopically. It developed that the strains cultivated in the media containing 1 per cent. amygdalin, salicin or mannit formed spores in large number, many of which were seen to be in the free state. On the other hand, no sporulation took place in the media containing glucose, lactose, maltose, glycogen, saccharose, dextrin, and levulose, in 1 per cent. Likewise, no sporulation was obtained in milk. In control tubes some spores were seen to be present with the strain of Professor Smith, but far less than in the media containing amygdalin, salicin, or mannit. It was also noticed that the substances in the presence of which no sporulation occurred, were fermented by these strains, and the reaction of the cultures became very acid; while the glucosides and mannit remained almost unattacked, or were fermented to only a slight degree, the violet tint being little changed (litmus media). Exactly the same results were obtained when, instead of sugar-free bouillon, Hiss' serum-water was employed as the basic medium. With Hiss' medium, 1 per cent. sorbit, dulcit and inulin were also tried, and found to behave in a manner similar to the glucosides

and mannit in enabling the organisms to sporulate. It was noticed later, however, that even in these media some strains—especially that of Professor Smith—sporulate more easily than the others.

Discussion.

Dr. Charles Norris said that he had always felt that there were a large number of organisms included under the name of aerogenes capsulatus. While working in the laboratory of the College of Physicians and Surgeons at the time Dr. Dunham's paper appeared, he had experimented with a number of cultures which he had on hand, using serum-water and Loeffler's, and had been unable to convince himself that the species which he had, did form spores. There was evidently great variation also in regard to gas formation. With many species of aerogenes one did not get the swelling of the rabbit's body as quickly as with others. With some of the cultures he had obtained one could recover bacilli from the frothy fluid as it exuded from the nose at room temperature, within three or four hours.

ACUTE CALCIFICATION OF THE ARTERIES IN A CAT WITH TRANSPLANTED KIDNEYS.

ALEXIS CARREL, M.D.

Dr. Alexis Carrel showed specimens of acute calcification of the arteries in a cat whose kidneys had been removed and replaced by kidneys from another cat. This calcification was of a very peculiar kind. The clinical history of the cat was very simple. The animal was a young adult, in perfect health. Before beginning the experiment

the cat's urine was examined; the quantity was found to be normal, and there was no albumin. Both kidneys were then removed and immediately replaced by both kidneys from another cat. After this operation the life of the cat went on just the same as before. The quantity of urine was undiminished; the composition was practically the same; and the animal was apparently in good health. Examination of the urine showed that there was no albumin; and the size of the kidneys was entirely normal.

Fifteen days after the operation the animal was considered to be completely recovered and was allowed to go about the laboratory freely. At that time it took a great deal of exercise. After two days of exercise, it was found that both kidneys were very much enlarged. At the same time the quantity of urine was increased, and contained an enormous amount of albumin. Laparotomy was performed and the kidneys were found to be very much enlarged. The circulation in the renal vessels was perfectly normal. There was no congestion of the kidney; and after incision of the capsule of the kidney clear fluid and blood escaped. There was at the same time edema of the connective tissue. The wound was closed and during the days following the operation the quantity of albumin diminished. The size of the kidneys also diminished progressively; but about twenty-five days after the operation the animal appeared to be sick, refused to eat, and died thirty-six days after the operation.

A post-mortem examination was performed, and on opening the abdominal cavity it was found that both kidneys were of normal size, color, and consistency, though they had appeared slightly enlarged. On section they were apparently normal. The ureter and bladder, too, were normal. The only abnormal feature was that the wall of the abdominal aorta was exceedingly hard, amounting to complete

calcification. The mesenteric artery, too, was calcified. Examination of the other organs did not show any marked change. Sections of the carotid and femoral arteries showed the same lesion. The arteries were completely calcified; the walls were of the consistency of a thin glass tube, and could be broken the same as glass. Examination of the organs of the thoracic cavity showed exceedingly marked change. In the aorta it was possible to see areas of calcification. Examination of the specimen showed that there was a deposit of salt in the adventitia which extended into the media. The lesion was more localized in some arteries and the internal part was not in normal condition, but the lesion was much less marked. In the carotid artery the lesions were localized in the external part and practically all the media was completely destroyed. The kidneys were in good condition.

It would be interesting to explain the course of this very marked change, but at the present time one could only draw hypotheses. It was not possible to ascertain the nature or cause of the modification of the metabolism which produced this great anatomical change. In order to try to reproduce the lesion, Dr. Carrel had begun some experiments. For instance, by denudation of the kidneys and suppression of the circulation for a little while it was hoped that some lesion would occur which would perhaps produce a lesion of the vessels similar to lesions found in this cat. He had also tried adding two suprarenals to a cat in order to produce some modification of the arterial system; but at the present time it was certainly very difficult to explain the cause of the anatomical lesion found in this animal.

Discussion.

Dr. A. Mayer asked whether control experiment had been made. It would also be interesting to know whether

the cat from which the kidneys were transplanted was an older cat than the one receiving the kidneys, in which one might have conditions of calcification. He would also like to know whether or not control experiments had been made with cats of the same age, in which case some other lesions might perhaps be noted.

Dr. Horst Oertel asked whether any changes had been found in the vasa vasorum or in the bones. This seemed interesting to him in view of the fact that these changes were observed in the adventitia, not in the intima, as in true arteriosclerotic calcification. Inasmuch as there must have been a large demand for calcium within a comparatively short time, it would also be instructive to know something of the condition of the bone.

Dr. P. A. Levene asked whether or not observations have been made on the conditions of the blood vessels of animals which had received injections of tissue emulsions.

Dr. A. W. Wadsworth said that he recalled autopsying animals after prolonged immunization, and seeing in two or three such animals marked calcification of the arterial system extending from the heart through into the abdomen. He had, of course, made no study of the calcification as he was simply studying the immunity of these animals and had not determined whether the calcification was due to age or not; but he had autopsied many rabbits and had seen this peculiar degeneration in no other animals. The animals were inoculated subcutaneously and intravenously. Other observers, Dr. Wadsworth thought, had obtained arterial lesions experimentally in animals as the result of bacterial inoculation.

Dr. Carrel said that the cat which underwent the transplantation was about one year old. At the time of the transplantation it was necessary, of course, to make a dissection of the abdominal aorta and the vessels of the kidney,

and these were held between the fingers; so that it was easy to say that they were absolutely elastic. The second cat, the one which gave the kidneys, was about two years old and was in very good condition. For the transplantation it was again necessary to make an extensive dissection of the aorta and it was easy to see the condition of the vessels. This cat had a perfectly normal aorta without any calcification. In the other experiments of transplantation of the kidneys, Dr. Carrel did not observe any kind of calcification. It might be that some lesion of the organ occurred which was followed by the special trouble of metabolism which produced calcification. No definite study of the small vessels had been made. The vessels of the spleen and liver showed no calcification of the walls, though there might be some slight infiltration, especially of the splenic artery.

METAPLASIA AND LYMPHATIC METASTASIS OF A RAT TUMOR.

J. W. JOBLING, M.D.

I wish to speak briefly of a tumor of the rat that has been under study and transplantation by Dr. Flexner and myself for more than two years. The tumor originated in the seminal vesicle of a rat and has now been carried through about twelve generations. It is clear that the tumor is one that will probably remain indefinitely transplantable. We have not attempted to shorten the period between the generations, which would have been easily possible, in order to secure a larger number of them. The tumor is relatively a slow-growing one: to reach the size of a walnut takes about three months, which is also about

the average length of time required to produce internal metastases and bring about spontaneous death.

The primary tumor was of mixed character but it approached the connective tissue rather than the organoid type. It was, however, different from the ordinary sarcomata since while it was composed mainly of spindle cells there were associated with these, cells of an epithelioid or endothelioid character. The latter cells were even at times arranged into tubuli with bibullated connective tissue delimination.

In the course of further transplantation these larger cells tended, in certain series, to increase in number at the expense of the spindle cells until in the fifth generation they became dominant. At the present time the tumor of the eleventh generation is composed of an adenomatous growth which bears little or no resemblance to the original tumor.

This change is not confined to the microscopic appearances alone. The smaller tumors of the original type were usually round and so firm that it was almost impossible to pick one up with plain tissue forceps. The tumor at the present time is of softer consistence and much more readily broken up.

Since one series of transplantations has undergone this adenomatous change and the other has not, and as both forms of the tumor are still growing in different rats, it is easy to distinguish them in the living animals by means of their hardness.

The tumor of the eleventh generation which is most greatly altered shows spindle cells only at the advancing edge, while the body of the tumor is composed of a dense fibrous stroma upon and in the regular spaces of which the epithelioid cells are implanted and at times in an imbricated manner. Larger spaces suggesting cystic dilatations,

smaller alveoli suggesting acini, and outgrowths suggesting papilloma all occur. Mitotic figures are fairly common.

Coincident with this structural change a new class of metastases has appeared. Previous to the fifth generation and before the alteration in the tumor being considered took place, lung and kidney metastases were frequent, but no lymphatic metastasis was encountered. Beginning with the fifth generation lymphatic metastases have become more and more frequent, until now, in the eleventh generation, though only a few of the animals of the series have died. yet the number of rats showing lymphatic nodules is much larger than ever before.

The adenomatous tumor grows faster than the tumors of the original type. Tumors of the twelfth generation (adenomatous) are at the end of three weeks as large as the tumors of the older type were at the end of four to five weeks.

THE RATIO BETWEEN THE WEIGHT OF THE HEART AND THE WEIGHT OF THE BODY IN ANIMALS.

DON R. JOSEPH, M.D.

(From the Department of Physiology and Pharmacology of the Rockefeller Institute for Medical Research)

Dr. Don R. Joseph said that there was a certain average ratio of weight between heart and body which could be considered normal. For the human being, tables had been compiled showing the average weight at different ages (1). During the past three months he had studied

(1) See *Vierordt:* Anatomische, Physiologische und Physikalische Daten und Tabellen. 1906.

the relation between the heart weight and the body weight of animals used in the laboratory. The weight of each animal was taken before any operation was begun, and after death the heart was removed, emptied of blood, and weighed. The animals studied were dogs, cats and rabbits. By the term "ratio of heart weight to body weight" was meant the number of *grams* of heart tissue to every *kilogram* of body weight.

According to Vierordt's tables, in man, the younger the individual the higher the ratio between the weight of the heart and the weight of the body. In Dr. Joseph's series, the ages of the animals were, of course, indefinite. It was found that the average ratio of each species was quite constant for that species. As an example of this, a dog whose body weight had not been previously determined was operated upon, and after death, from the weight of the heart the total body weight was estimated to be 12 kilos 450 grams. The actual weight of the body was found to be 12 kilos 100 grams.

Species	Sex	Number of Cases	Average Heart Weight	Average Ratio
Human[1]	Male	30	301	4.60
	Female	27	260	——
Dog	Male	28	62	7.50
	Female	25	42	7.64
Cat	Male	10	13	4.65
	Female	15	12	4.58
Rabbit	Male	21	4	2.70
	Female	36	4	2.88

(1) Taken from Vierordt's Tables.

From the table it would be seen that the ratio in human beings and in cats was about the same, that in dogs much higher, and that in rabbits much lower. An explanation of this condition in the rabbit might be that the stomach and cecum of this animal have an enormous capacity, so that if the weight were taken after a full meal the ratio would, of course, be low. A ratio in which the stomach and cecum contents were excluded would probably be nearer that found in other animals. In the case of the rabbit there was also another variation. Whereas in man, dogs, and cats, the male ratio was much higher, in rabbits, the female was the greater. This was possibly due to the fact that the female rabbit is less active than the male, and, therefore, the contents of the cecum and stomach are greater.

Dr. Joseph thought that his present figures indicated that the relation of the weight of the heart to that of the body follows the law, not of a *direct* but of an *inverse* proportion, or, in other words, the ratio diminishes as the body weight increases. This law might be connected with the well known observation that small animals have high pulse rates, or, in other words, the smaller the animal the higher the pulse rate. Could not this rapid heart beat be the cause of a physiological hypertrophy?

DEMONSTRATION OF TREPONEMA PALLIDUM WITH THE DARK-FIELD ILLUMINATION MICROSCOPE.

SIMON FLEXNER, M.D.

I am glad to have the opportunity of exhibiting to the Pathological Society this microscope, made by Reichert of Vienna, which will, I think, become of value in certain kinds of study, and I am particularly glad to be able to exhibit

living specimens of Treponema pallidum with it. All doubt and discussion regarding the microorganismal nature of the pallidum have now been removed, thanks to this ready method of observing with ease and distinctness its changing form and motions.

The specimens which you will see were obtained from an unopened papule of the tongue from a patient who began to show secondary lesions of syphilis five weeks ago. When she reported at the City Hospital, a lesion, probably the primary one, was found on the genitals and she exhibited a general maculo-papular eruption. As you will observe, the spiral organisms, which have the character of T. pallidum, are quite numerous. Every field of the microscope contains one or more of them, and they are actively mobile.

On account of the large number of members present, you cannot study the individual organism closely enough to make out all its motions. The motions which are immediately evident are a side to side and a forward and backward one, that are constant and are probably chiefly Brownian in nature. I have observed these motions after the slides have been in the refrigerator for several days and they were almost as active as at present. These oscillations give a dancing appearance to the organism. But in addition to these, many of you will see the spirals revolve on their long axis, or execute sharp contractions, or bend their bodies so as to bring the opposed ends together to form a circle, or move slowly forward across the field of the microscope by turning or by a series of contractions.

The activity of the spirals is greatest immediately after being taken from the lesion. At this time, it is sometimes difficult to follow the evolutions—turnings, bendings, contractions—through which they pass. If at this period two individuals come together, they are apt to twine one about the other to form those combinations which have been mis-

taken for evidences of longitudinal division, etc. The entwined individuals may be seen to unwind and to go off across the field of the microscope. The mobility lessens after an hour or two or even after a less time; but a certain grade of mobility can be discerned some hours after the preparation has been made provided the evaporation of the fluid has been prevented.

Slides kept in the refrigerator continue to show the pallidum for a week or longer, but the refraction is altered in the kept specimens and they show less brilliantly than in the fresh state. The specimens keep poorly at the room temperature because of the development of saprophytic bacteria which tend to obscure or destroy the pallidum.

I have studied local syphilitic lesions—chancre and papillary lesions of the skin and mucous membranes—and have had no difficulty in finding the pallidum in them. The rapidity with which they can be demonstrated, often almost at once after placing the slide under the microscope, is very striking and will make this method of examination of great diagnostic value. The method is particularly well-adapted for dispensary and office practice. I have found rather larger numbers of the pallidum in papules of the mouth and a papule of the penis than in primary lesions. But I have not found it difficult to demonstrate the spirals in primary lesions. Since the apparatus has been in use I have had no opportunity to examine lymphatic gland juice or tissues from syphilitic fetuses.

A primary lesion on the eyebrow of a macac monkey, which was of a few days duration and not ulcerated, showed the pallidum in fair numbers and in a very active condition and it was indistinguishable from the organisms from human beings.

In preparing preparations for the microscope it is desirable to secure lymph with as little admixture of blood as

possible. The fewer the large morphological elements in the preparation, the clearer will the field be and the easier the pallidum will be found. Air bubbles should be sedulously avoided; and it should be remembered that many minute, ultramicroscopic particles not visible in the field of the ordinary microscope become visible in the field of the dark-field microscope.

DEMONSTRATION OF THE SPIRILLUM OF TICK FEVER.

B. T. TERRY, M.D.

The second organism demonstrated, the Spirillum of Tick Fever, was obtained originally by Dr. Robert Koch in East Africa from a case of human relapsing fever. This African fever is quite distinct from the European relapsing fever. From the latter it differs, as a rule, by shorter attacks and relapses, by very irregular intervals between relapses (these varying from one day to three weeks), and by the greater number of possible relapses (eleven have been noted), even at the height of the infection.

By immunity experiments, Fraenkel has recently shown that the spirillum causing relapsing fever in East Africa differs specifically from that causing a similar disease in West Africa. For the former he proposes the name "Spirillum of Tick Fever," retaining the older name "Spirochaeta duttoni" for the West African disease. Both of the African organisms are transmitted from patient to patient by the bite of a tick, *Ornithodorus moubata*. Some of the eggs of infected ticks are infected, and the young, hatched from infected eggs, are capable of transmitting the

disease. The organism of tick fever is larger than Sp. pallidum, its undulations are less regular, its movements are more active, and, under the dark-field microscope it makes a more brilliant picture.

A CASE OF TUBERCULOSIS OF THE DUCTUS THORACICUS.

RICHARD WEIL, M.D.

The specimen presented was taken at autopsy from a case of acute general miliary tuberculosis. All the organs usually involved in these cases showed the typical lesions, a very great number of very early miliary tubercles. The lungs showed no old lesions with the exception of an apical scar. The bronchial lymph nodes were considerably enlarged and caseous. The thoracic duct showed a number of tubercles protruding into the lumen of the duct, considerably larger than any of the tubercles in the organs, which were all very small. In addition, there were distinct ulcerations along the course of the duct. The lesions in the duct were in an intermediary stage between the old lesions in the bronchial lymph nodes and the general miliary tuberculosis. Sections of the duct were demonstrated, showing caseous masses containing numerous tubercle bacilli, projecting into the lumen of the duct.

As far as the literature was concerned, Dr. Weil said that the Phipps autopsy records show no mention of the lesion. Longcope in his studies devoted special attention to the point and in a series of thirty autopsies examined the thoracic duct very carefully. In ten he found that he could demonstrate caseous lesions in the duct. In a few other

cases he found miliary tubercles which were of the same age as the miliary tubercles elsewhere in the body, and therefore did not count, as according to Weigert's law the lesions in the duct must be much older in order to be considered primary.

A CASE OF DOUBLE PYELITIS, URETERITIS, AND CYSTITIS CYSTICA.

O. H. SCHULTZE, M.D.

Dr. O. H. Schultze presented a case of double pyelitis, ureteritis and cystitis cystica, with a large renal calculus on the left side, the organs having been obtained from a male adult, about fifty years of age, a patient at the Metropolitan Hospital. The lesions described had practically nothing to do with the patient's death, as there was also a very large dilated heart, insufficiency of the mitral valve and very extensive chronic tuberculosis with the formation of cavities and considerable fibroid connective tissue. The bladder showed in the trigone a large number of cysts, varying in size from a fraction of a millimeter to several millimeters in diameter. Both ureters also showed these cysts, some quite large near the opening of the bladder. The pelvis of the right kidney showed several cysts, some containing pale fluid and others yellowish brown fluid. The left kidney had a large stone filling the entire pelvis and the calyces. There were also several cysts in the pelvis.

The subject of ureteritis cystica had been so well covered by Dr. Stow in his paper before the Society (February, 1907) that Dr. Schultze thought it unnecessary to go into it. Regarding the question of chronic irritation of one kind or

another as a cause, Dr. Schultze said that in a case such as the one shown one might jump at the conclusion that the stone had something to do with the lesion, but, on the other hand, no stone was found on the right side, which also contained cysts. Dr. Schultze had seen several cases of the affection in the bladder, but this was the first case he had seen of the lesion in the pelvis of the kidney. Besides the points already mentioned there were also a few purulent foci in one kidney.

A CASE OF DIPHTHERITIC LARYNGITIS, TRACHEITIS AND BRONCHITIS.

THOMAS FLOURNOY, M.D.

The chief interest in this case was in the examination of the gross specimen, as the extent of the membrane formation was rather unusual. The case had come to autopsy a few days ago. The patient was a man who had been sick for about one week. He was in the hospital only about twenty-four hours before death. He had had some bleeding from the nose before he died, but the heart action had been good. The membrane extended from the epiglottis to the finer bronchi.

A CASE OF ENDARTERITIS OBLITERANS.

I. LEVIN, M.D.

Before demonstrating the specimens, I shall give a brief clinical history of the case. The patient, a man, aged thirty-five years, came to my office complaining of severe pain in the right big toe and leg which had continued for the last eight weeks. On examination, the patient was found to be

poorly nourished and anemic. The right leg and foot were paler than the left, and were cold and clammy to the touch. There was a small gangrenous spot on the inner surface of the nail phalanx of the big toe. No pulsation could be felt in the arteria dorsalis pedis or tibialis postica; there was faint pulsation at the upper section of the popliteal. Otherwise, the patient had no organic disease, no heart lesion, tuberculosis, Bright's disease, diabetes, or congenital or acquired syphilis, and no indication of general arteriosclerosis. I made a diagnosis of spontaneous gangrene due to endarteritis obliterans, and devised amputation at the knee joint. At the urgent request of the patient, however, I first amputated the toe. Gangrene developed at the line of incision and two weeks later I amputated the leg at the knee joint. The patient made an uneventful recovery.

On gross examination all the arteries of the leg appeared very hard and unelastic. Microscopical sections were taken from the upper part of the tibial artery as well as from the stump of the toe. I take here the opportunity to thank Dr. J. H. Larkin for his help in the preparation of these specimens.

Study of the specimens reveals the following conditions: The walls of all the arteries as well as of the veins are greatly thickened, due mainly to a proliferating hypertrophy of the middle muscular coat. The intima is only occasionally thickened, and then in a comparatively small degree. The lumen of the vessels, while always diminished, is completely occluded only in the very small branches of the arteries, both the tibialis and dorsalis pedis being patent. In the arteries no thrombus formation could be detected, but most of the veins contain organized or unorganized thrombi. There was also noticed connective tissue formation in the nerve sheaths and intrafascicular bands of the nerves.

In considering cases of this kind there are two questions

presented for solution: First, is the etiological factor which produces a local lesion in the blood vessels much severer in extent than any found in cases of general arteriosclerosis? Second, what is the reason that in some of these cases gangrene forms comparatively soon, as in my case, while other cases continue for years as conditions of so-called "intermittent claudication" without any tendency to gangrene?

As to the first question, some investigators consider endarteritis obliterans a local manifestation of some general infection like syphilis, or intoxication like tobacco. Others maintain that the primary etiological factor is a diseased condition of the vasomotor nerves. Neither morphological nor experimental study can determine this question. A lesion of the arterial wall looks very much the same whether it is caused by spyhilis, diabetes, or experimental injection of adrenalin or tobacco. But the clinical examination of these cases shows that the best explanation of these conditions is that they are due to a primary lesion of the vasomotor nerves. The main clinical symptoms of the disease are vasomotor disturbances and pain. The same symptoms occur in a group of cases faultily called Raynaud's disease. While in the latter disease all the symptoms, as well as gangrene, are due to ischemia caused by a nervous spasm of the muscularis, in endarteritis obliterans the constant irritation of the vasomotor nerves goes a step further and causes hypertrophy of the muscularis and subsequent proliferation of the other tissues of the walls of the blood vessels.

Gangrene or local death of tissue is caused by a complete loss of blood supply. If in two cases of endarteritis obliterans there was gangrene in one and not in the other, apparently the explanation would be that in the latter case the general circulation was strong enough to overcome the increased local obstruction, which it could not do in the former. The venous thrombi of my case show that the circulation in the leg had been very slow and inadequate.

Discussion.

Dr. Charles Norris asked what the nationality of the patient was.

Dr. Levin said that he had neglected to state that the patient was a Russian Hebrew, as were all of these patients, with the exception of some cases reported from Japan.

Dr. James Ewing said that he had recently had an opportunity of examining an advanced case of this kind, occurring in the New York Hospital, for Sp. pallida, by the Levaditi method, and though he had made quite a number of sections and was satisfied that the stain was successfully performed, he had been entirely unable to find any traces of Sp. pallida.

Dr. J. H. Larkin said that Dr. Levin had turned over to him the amputated leg, from which he had dissected all the blood vessels. At the time he had first seen it he could not for a moment conceive why he would amputate a leg below the knee for practically an insignificant amount of necrosis involving only the great toe; but careful dissection of all the blood vessels from the distal part of the leg showed a very marked disease of the posterior tibial artery and of the smaller arteries dissected out at that time. At first glance the microscopical sections which had been made of all the arteries available on dissection showed the advantage of such a surgical procedure. The arteries showed perhaps one of the most marked cases of endarteritis that one could possibly see from a case with an almost insignificant amount of gangrene occurring only around the nail of the toe. Inflammation of the nerves, perineurium and endoneurium, in this particular case, both in the upper part of the amputated stump and in the neighborhood of the gangrenous area is most marked. The cellular endophlebitis around the veins and the marked parietal thrombi in the veins were most sig-

nificant. Dr. Larkin thought that from the microscopical sections, the magnitude of the operation and the insignificance of the change for which the operation was done, this might be considered a notable case, showing the advisability of such a procedure.

Dr. Horst Oertel asked what this case was to be considered. According to Dr. Levin the process consisted of hypertrophy of the media, and according to Dr. Larkin it was endarteritis.

Dr. Levin said that these cases were called endarteritis obliterans; why, he did not know. Apparently in a majority of the cases the affection is only in the media or the muscularis. Some authors have reported cases where thrombi did form in the arteries, and these would probably be more properly called endarteritis. To answer the question touched upon by Dr. Larkin, Dr. Levin said that he had not intended to say anything in regard to surgery, but since the question, why amputate a leg when the lesion is only in the toe, had been raised, he would say that it was known clinically that in these cases nothing short of amputation below the knee will stop the gangrenous process. During the course of this operation no bleeding took place.

Dr. Larkin said that when Dr. Oertel looked at the lesion under the microscope he would find, not only an endarteritis, but also an hypertrophy of the media and the muscularis. Another interesting thing in connection with this case was the presence of organized thrombi in the veins in connection with the arteries. He thought that with the slow circulation occurring in the arteries and veins there was probably partial organization and canalization in the various vessels. He considered the case a combined endarteritis and fibrous formation in the musculature.

Dr. T. C. Janeway asked whether Dr. Larkin and Dr. Levin were dealing with the same arteries when they spoke

of endarteritis and of hypertrophy of the media. If they were dealing with the larger arteries central to the obstruction, hypertrophy of the media was the process which would be expected. Dr. Carrel, in his studies at the Rockefeller Institute on the effects of suturing arteries into veins, had shown that the physiological effect of lowered pressure in the blood vessels was apparently to produce a regressive change in the muscular coat with increase in the size of the lumen. On the other hand, arteries central to a narrowing show extreme thickening with diminution of the lumen. Endarteritis obliterans as a true inflammatory disease of the arteries had nothing to do with these changes. Dr. Janeway also took issue with Dr. Levin's statement that in all these cases the gangrene goes up to the knee. One sees a proportion of the cases where the gangrene is demarcated. These cases are extremely interesting clinically, inasmuch as they present every gradation from the old people with simple cramps in the leg at night, because when they sleep the velocity of the blood flow is not sufficient to keep up the peripheral circulation, to the cases of true intermittent claudication on walking, and Raynaud's disease. Whether in these cases the nervous influence produces the thickening of the vessels and the gangrene, or whether the thickening of the vessels is the cause of the pain, is apparently unsolved.

Dr. Larkin said that from his dissection of the arteries in this case he thought that this was practically the smallest popliteal artery he had ever seen. Microscopical examination of the artery at the amputated stump showed a marvellous diminution in size. He was sure that the process was a pathological and not a physiological hypertrophy.

Dr. Janeway asked whether Dr. Larkin meant a diminution in the lumen or in the wall of the artery.

Dr. Larkin said that he meant a diminution, not only of the lumen, but of all the coats of the artery.

Dr. Harlow Brooks asked whether the term hypertrophy of the muscular coat had been chosen with due deliberation.

Dr. Larkin said that he had not had the opportunity of putting through all the arteries to decide upon the exact amount of connective tissue which occurred in the musculature, but he thought one might gain a good idea from the sections of the amount of hypertrophy of the muscle.

Dr. Oertel said that if he understood correctly the process was then simply an endarteritis obliterans with some changes in the media?

Dr. F. S. Mandlebaum said that he had not intended to say anything at this time, but inasmuch as he had been called upon he would like to say that Dr. Buerger had been working on this subject for some time in the laboratory of the Mt. Sinai Hospital. He had had eight cases similar to the one reported. He had concluded that instead of being endarteritis, all of these cases were due to the formation of thrombi in the vessels. These showed more or less canalization; but it was apparent that the process is not a disease of the intima of the vessels at all, but is entirely due to thrombi and secondary changes. Dr. Buerger was about to publish his series of cases at an early date, and Dr. Mandlebaum thought he had come to a valuable conclusion.

Dr. Larkin said that Dr. Mandlebaum's statements did not apply to this case. This man had only a gangrene of his toe. His leg was amputated below the knee. He had a general endarteritis obliterans. While he did not doubt that Dr. Mandlebaum was perfectly correct as regards the eight cases to which he referred, these threw no light upon this particular case.